U. S. DEPARTMENT OF AGRICULTURE.
DIVISION OF BOTANY.

CONTRIBUTIONS

FROM

THE U. S. NATIONAL HERBARIUM.

Vol. VI.

Issued July 31, 1901.

PLANT LIFE OF ALABAMA.

AN ACCOUNT OF THE DISTRIBUTION, MODES OF ASSOCIATION, AND ADAPTATIONS OF THE FLORA OF ALABAMA, TOGETHER WITH A SYSTEMATIC CATALOGUE OF THE PLANTS GROWING IN THE STATE.

Prepared in cooperation with the Geological Survey of Alabama

By CHARLES MOHR, Ph. D.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

BORROWED PUBLICATION

SYSTEMATIC CATALOGUE OF THE PLANTS GROWING WITHOUT CULTIVATION IN ALABAMA, INCLUDING DESCRIPTIONS OF NEW, RARE, AND LITTLE-KNOWN SPECIES.

SLIME MOLDS.[1]

Subkingdom MYXOTHALLOPHYTA (MYXOMYCETES). Slime Molds.

Order PLASMODIOPHORALES.

Family PLASMODIOPHORACEAE.

FRANKIA Brunch.

Frankia alni (Wor.) Atkinson.

Ala. Bull. 133. Cornell Bull. 50.

Forming galls on roots of *Alnus* sp. Lee County, February, 1892 (*Atkinson*); July, 1896 (*Underwood & Earle*).

Frankia ceanothi Atkinson, Bull. Torr. Club, **19**:171. 1892.

Ala. Bull. 133. Cornell Bull. 50.

On roots of *Ceanothus americanus*. Lee County, Auburn, November, 1891 (*Atkinson*); Lee County, May, July, 1896 (*Underwood & Earle*).

Order MYXOGASTRALES.

Family TRICHIACEAE.

ARCYRIA Hall.

Arcyria ferruginea Sauter.

Ala. Bull. 133.

Lee County, February, 1896 (*Underwood & Earle*).

Arcyria punicea Pers.

Ala. Bull. 133.

Lee County, December, 1895 (*Underwood*); February, 1896 (*Underwood & Earle*).

TRICHIA Hall.

Trichia affinis De Bary.

Ala. Bull. 135.

Lee County, February, 1896 (*Underwood & Earle*).

Trichia chrysosperma (Bull.) DC.

Ala. Bull. 135.

Lee County, November, December, 1895 (*Underwood*).

Trichia varia Pers.

Ala. Bull. 135.

Lee County, December, 1895 (*Underwood*).

---

[1] Contributed by Prof. F. S. Earle, of the Biological Survey of Alabama, April, 1899. Collection made mostly in the vicinity of Auburn, Ala.

TUBULINA Pers.

Tubulina cylindrica (Bull.) DC.
Ala. Bull. 135.
Lee County, March, 1896 (*Underwood & Earle*).

HEMIARCYRIA Rostf.

Hemiarcyria clavata (Pers.) Rostf.
Peters coll. Ala. Bull. 134.
On *Pinus* sp. (*Peters*).

Hemiarcyria funalis Morgan.
Ala. Bull. 134.
Lee County, December, 1895 (*Underwood*).

Hemiarcyria rubiformis (Pers.) Rostf.
Ala. Bull. 134.
Lee County, November, 1895 (*Underwood*); February, 1896 (*Underwood & Earle*).

Hemiarcyria serpula (Scop.) Rostf.
Peters coll. No. 105. Ala. Bull. 134.
(*Peters.*) Lee County, December, 1895 (*Underwood*).

LYCOGALA Michx.

Lycogala epidendron (L.) Buxb.
Ala. Bull. 134.
Lee County, February, March, 1896 (*Underwood & Earle*).

CALONEMA Morgan.

Calonema aureum Morgan.
Ala. Bull. 133.
On rotten wood. Lee County, December, 1895 (*Underwood*).
Ohio.

Family CRIBRARIACEAE.

CRIBRARIA Schrad.

Cribraria argillacea Pers.
Grevillea, **2**:68, as *Licea spermoides* B. & C. Ala. Bull. 134.
(*Beaumont.*)

DICTYDIUM Schrad.

Dictydium cernuum (Pers.) Nees.
Peters coll., as *D. umbilicatum*. Ala. Bull. 134.
(*Peters.*)

PERICHAENA Fr.

Perichaena corticalis (Batsch) Rostf.
Peters coll. No. 106. Ala. Bull. 134.
(*Peters.*)

Family CLATHROPTYCHIACEAE.

CLATHROPTYCHIUM Rostf.

Clathroptychium rugulosum (Wallr.) Rostf.
Peters coll. Ala. Bull. 133.
On Quercus, 1873 (*Peters*).

ENTERIDION Ehrh.

Enteridium olivaceum Ehrh.
Peters coll. No. 125a, as *Licea applanata*. Ala. Bull. 134.
(*Peters.*)

Family RETICULARIACEAE.

RETICULARIA Bull.

Reticularia atra (A. & S.) Fr.
Ala. Bull 135. Lee County, March, 1896 (*Underwood & Earle*).

Family DIDYMIACEAE.

Didydium clavus (A. & S.) Rostf.
Peters coll. Ala. Bull. 134.
August, 1855 (*Peters*).

Family SPUMARIACEAE.

SPUMARIA Pers.

Spumaria alba (Bull.) DC.
Peters coll. Ala. Bull. 135.
1865 (*Peters*).

Family PHYSARACEAE.

BADHAMIA Curt. & Berk.

Badhamia decipiens (Curt.) Berk.
Grevillea, **2**:66, as *Physarum chrysotrichum* B. & C. Ala. Bull. 133.
On dead wood (*Peters*).

LEOCARPUS Link.

Leocarpus fragilis (Dicks.) Rostf.

PHYSARUM Pers.

Physarum cinereum (Batsch) Pers.
Ala. Bull. 134.
On grass and clover. Lee County, March, 1896 (*Underwood & Earle*).

Physarum flavicomum B. & Br.
Peters coll. Ala. Bull. 134.
1855 (*Peters*).

Physarum petersii B. & C.
Grevillea, **2**:66. Peters coll. No. 104. Ala. Bull. 134.
On dead wood (*Peters*).

Physarum pulchripes Peck.
Ala. Bull. 134.
Lee County, March, 1896 (*Underwood & Earle*).

FULIGO Hall.

Fuligo septica (Link) Gmel.
Peters coll. No. 107. Ala. Bull. 134.
(*Peters.*) Lee County, April, 1896 (*Underwood & Earle*).

Family STEMONITACEAE.

STEMONITIS Gled.

Stemonitis fusca Roth.
Ala. Bull. 135.
Lee County, February, 1896 (*Underwood & Earle*).

Stemonitis microspora Lister.
Ala. Bull. 135.
Lee County, February, March, 1896 (*Underwood & Earle*).

Stemonitis tenerrima B. & C.
Ala. Bull. 135.
Lee County, November, 1895 (*Underwood*).

COMATRICHA Preuss.

Comatricha friesiana (De Bary) Rostf.
Ala. Bull. 133.
(*Peters.*)

Comatricha typhina (Roth) Rostf.
Peters coll. Ala. Bull. 133.
(*Peters.*)

Family CERATIOMYXACEAE.

CERATIOMYXA Schroet.

Ceratiomyxa mucida (Pers.) Schroet.
Ala. Bull. 133.
(*Peters, Beaumont*). Lee County, April, 1896 (*Underwood & Earle*).

ALGAE.

As yet the study of the classes of true thallophytes, embracing the plants generally described as algae, has received scarcely any attention in Alabama. The sandy shoals and the sandy shores washed by the waves along the eastern Gulf coast from Louisiana to northwestern Florida are unproductive of algae, and only a few species of the higher forms find their home on our shore. With the exception of Characeae and Lemaneaceae, it has been necessary to omit the so-called fresh-water algae, as we know too little of them at present.

The successful efforts of Dr. George H. Taylor and the Messrs. K. M. Cunningham and William McNeil in cleansing samples of the mud of Mobile Bay obtained from the almost fresh water of the estuary of Mobile River, the more or less brackish water of the upper bay and the brine of the lower bay have brought to light a considerable number of interesting forms of the diatom family, which are here placed on record. The work of these skillful and diligent collectors has been spoken of by Hon. J. D. Cox, LL. D., of Cincinnati, in the American Monthly Microscopic Journal.[1] At the same time the following list has been furnished by Mr. Cox, to whom the cleansed material was at the time submitted for examination. The generic and specific names have been revised to conform with De Toni's Sylloge Algarum.

[1] Vol. 6, p. 145 (August, 1885).

Subkingdom EUTHALLOPHYTA.

Division EUPHYCEAE.

Order BACILLARIALES.

Family BACILLARIACEAE (DIATOMACEAE).[1] Diatoms.

Subfamily DISCOIDEAE.

PARALIA Heib.

Paralia sulcata (Ehrenb.) Cleve. *Melosira sulcata* Kuetz.
Marine.
New Jersey.

COSCINODISCUS Ehrenb.

Coscinodiscus radiatus Ehrenb.
Marine.
New Jersey.

Coscinodiscus subtilis Ehrenb.
Marine and in brackish water.
New Jersey.

Coscinodiscus lineatus Ehrenb.
Salt and brackish water.
New Jersey.

Coscinodiscus excentricus Ehrenb.
Fresh, brackish, and salt water.
New Jersey.

ACTYNOPTYCHUS Ehrenb.

Actinoptychus undulatus (Bailey?) Ralfs.
Marine mud.
Tampa Bay (*G. H. Taylor*). New Jersey.

Actinoptychus splendens (Ehrenb.?) Shadb.
Brackish water.
Tampa Bay (*G. H. Taylor*). New Jersey.

Actinoptychus areolatus (Ehrenb.) Schmidt.

AULISCUS Ehrenb.

Auliscus caelatus Bailey.
Marine.
Tampa Bay (*G. H. Taylor*). New Jersey.

Auliscus sculptus (Wm. Smith) Ralfs.
Marine.
New Jersey.

Auliscus pruinosus Bailey.
Marine.
Tampa Bay (*G. H. Taylor*).

Auliscus punctatus Bailey.

PSEUDAULISCUS Lend.-Fortm.

Pseudauliscus radiatus (Bailey) Rattray. *Auliscus radiatus* Bailey.

---

[1] All the following species are from Mobile Bay.

EUPODISCUS Ehrenb.

Eupodiscus radiatus Bailey.

AULACODISCUS Ehrenb.

Aulacodiscus argus (Ehrenb.) A. Schmidt. *Tripodiscus argus* Ehrenb. *Eupodiscus argus* Wm. Smith.

Marine.
Tampa Bay (*G. H. Taylor*). New Jersey.

ACTINOCYCLUS Ehrenb.

Actinocyclus ehrenbergii Ralfs.

Subfamily BIDDULPHIOIDEAE.

CHAETOCEROS Ehrenb.

Chaetoceros varians (Lauder) Van Heurck. *Bacteriastrum varians* Lauder. *B. curvatum* Shadb.

TRICERATIUM Ehrenb.

Triceratium favus Ehrenb.

Salt or brackish water.
Tampa Bay (*G. H. Taylor*). New Jersey.

Triceratium alternans Bailey.

Marine.
New Jersey.

Triceratium punctatum Brightw. *T. sculptum* Shadb.

AMPHITETRAS Ehrenb.

Amphitetras antediluviana Ehrenb.

Marine.
Cosmopolitan.

ODONTELLA Agh.

Odontella aurita (Lyngb.) Agh. *Diatoma auritum* Lyngb. *Biddulphia aurita* Brébis.

Marine mud.
New Jersey.

Odontella turgida (Wm. Smith) Van Heurck. *Cerataulus turgidus* Ehrenb.

Marine mud.
New Jersey.

CERATAULUS Ehrenb.

Cerataulus smithii (Roper) Ralfs.

TERPSINOË Ehrenb.

Terpsinoë americana (Bailey) Ralfs.

New Jersey.

Terpsinoë musica Ehrenb.

Tampa Bay. New Jersey.

Subfamily FRAGILARIOIDEAE.

EUNOTIA Ehrenb.

Eunotia arcus Ehrenb.

Eunotia triodon Ehrenb.

Fresh water.
New Jersey.

GRAMMATOPHORA Ehrenb.

Grammatophora marina (Lyngb.) Kuetz.
Marine.
New Jersey.

Subfamily NAVICULOIDEAE.

NAVICULA Bory.

Navicula lyra Ehrenb.
Fresh and brackish (?) water.
New Jersey.

Navicula irrorata Grev.

Navicula permagna (Bailey) Edwards.
Brackish or salt water.
Tampa Bay. New Jersey.

Navicula maculata Edwards.

Navicula distans (Wm. Smith) Ralfs.

Navicula caribaea Cleve.

Navicula didyma Ehrenb.
Marine.
New Jersey.

Navicula kennedyi Wm. Smith.
Marine.
New Jersey.

Navicula praetexta Ehrenb.
Marine.
New Jersey.

Navicula serratula Grunow.

Navicula longa (Gregory) Ralfs.

Navicula major Kuetz.
Fresh water.
New Jersey.

Navicula nobilis (Ehrenb.) Kuetz.
Fresh water.
New Jersey.

Navicula aspera Ehrenb. *Stauroneis aspera* Ehrenb. *S. pulchella* Wm. Smith.
Marine.
Tampa Bay. New Jersey.

DICTYONEIS Cleve.

Dictyoneis marginata (Lewis) Cleve. *Navicula marginata* Lewis.
Fresh water.
New Jersey.

FRUSTULIA Agh.

Frustulia lewisiana (Grev.) De Toni. *Navicula lewisiana* Grev.

STAURONEIS Ehrenb.

Stauroneis phoenicenteron (Nitzsch) Ehrenb.
Fresh water.
New Jersey.

PLEUROSIGMA Wm. Smith.

Pleurosigma validum Shadb.

AMPHIPRORA Ehrenb.

Amphiprora costata O'Meara.[1]

PLAGIOTROPIS Pfitz.

Plagiotropis vitrea (Wm. Smith?) Grunow. *Amphiprora vitrea* Wm. Smith.

Plagiotropis elegans (Wm. Smith) Grunow. *Amphiprora elegans* Wm. Smith.

CYMBELLA Agh.

Cymbella heteropleura (Ehrenb.) Kuetz.

AMPHORA Ehrenb.

Amphora proteus Gregory.
Brackish or salt water.
New Jersey.

Amphora clevei A. Schmidt.

Amphora cingulata Cleve.

NITZSCHIA Hassal.

Nitzschia scalaris (Ehrenb.?) Wm. Smith.
Fresh or brackish water.
New Jersey.

Nitzschia sigmoidea (Nitzsch) Wm. Smith.
Fresh water.
New Jersey.

Nitzschia circumsuta (Bailey) Grunow.

Subfamily SURIRELLOIDEAE.

SURIRAYA Turp.

Suriraya febigerii Lewis.
Brackish water.
Tampa Bay. New Jersey.

Suriraya fastuosa Ehrenb.
Marine.
New Jersey.

CYSTOPLEURA Brébis.

Cystopleura zebra (Ehrenb.) Kuntze. *Epithemia zebra* Kuetz.

CAMPYLODISCUS Ehrenb.

Campylodiscus clypeus Ehrenb.

Campylodiscus limbatus Brébis.

Class CHLOROPHYCEAE. Green Algae.

Order PROTOCOCCALES.

Family HYDRODICTYACEAE.

HYDRODICTYON Roth.

Hydrodictyon reticulatum (L.) Lagerh.
Stagnant pools, ditches. Over the State.
United States, Canada, Europe.

[1] There is some uncertainty about this name.—Ed.

Order CONFERVALES.

Family ULVACEAE.

ULVA L. Sea lettuce.

Ulva lactuca (L.) Le Jolis.
On piles and sunken timber, salt and brackish water. Mobile Bay.

Ulva enteromorpha Le Jolis.
Mobile Bay, with the last.

Class CHARALES.[1]

Family CHARACEAE.

CHARA Vaill.

Chara gymonopus humboldtii A. Br.
In swiftly running streams. Bibb County, Little Cahawba River (*E. A. Smith*).
Louisiana to New England. Europe.

Chara fragilis (L.) Desv.
In swiftly running streams. Little Cahawba River, Bibb County (*E. A. Smith*).

NITELLA Agh.

Nitella glaziovii Zell.
In deep, gently flowing water. Estuary of Mobile River. September, fruiting abundantly under the water 10 feet deep.

Nitella tenuissima A. Br.
In deep, still, brackish water. Upper part of Mobile Bay; dredged from a depth of 15 feet and over.

Nitella tenuissima A. Br., forma.
In large tufts. Baldwin County, above the mouth of Fly Creek on the muddy bottom. Abundant.

Nitella acuminata A. Br.
In deep water. Estuary of Mobile River with *N. glaziovii*.

Nitella acuminata subglomerata A. Br.
With the above.

Nitella acuminata brachyteles A. Br.
With the last.

Class PHAEOPHYCEAE.

Order CYCLOSPORALES.

Family FUCACEAE.

SARGASSUM Agh. Gulf weed.

Sargassum bacciferum Turn.
Frequently washed ashore along the Mississippi Sound and on the strand of Baldwin County.

Sargassum vulgare Agh.
Rarely washed ashore on the outside shore and the outlying islands.

---

[1] Identified by T. F. Allen, M. D.

Class RHODOPHYCEAE. Red Algae.

Order NEMALIONALES.

Family LEMANEACEAE.

LEMANEA Bory.

Lemanea fucina mamillosa (Kuetz.) Atkinson. *L. mamillosa* Kuetz.
In rivulets. North Alabama (*Peters*). Mobile.
North Carolina, Chapel Hill.

TUOMEYA Harv.

Tuomeya fluviatilis Harv.
On rocks in Warrior River near Tuscaloosa, 1857 (*Tuomey*).
Virginia near Fredericksburg (*Bailey*); Connecticut; Maine, Mount Desert Island.

Family HELMINTHOCLADIACEAE.

BATRACHOSPERMUM Roth.

Batrachospermum moniliforme Rotlf.
In brooks and springs. Over the State; very variable. The Southern form inhabits in abundance swift-running pine-barren streams, attached to submerged timber and roots, with a thallus from 6 to 8 inches long of a deep green to olive-brown color. It has not been observed outside of the Coast Pine belt.

Order RHODYMENIALES.

Family SPHAEROCOCCACEAE.

GRACILARIA Grev.

Gracilaria armigera Harv.
Mobile. Mississippi Sound, Cat Island, Dauphin Island.

Family DELESSERIACEAE.

CALAGLOSSA (Harv.) J. G. Agh

Calaglossa leprieuri J. G. Agh.
Brackish water. Estuary of Mobile River, on immersed trunks.
Warmer seas of the Old World.
New Jersey.

FUNGI.

About the middle of the present century, following the work of Baron von Schweinitz in the same field, the Rev. M. A. Curtis, of North Carolina, and the Rev. M. J. Berkeley, of England, devoted their attention to the study of the fungi of the Southern United States. With these mycologists cooperated Mr. Ravenel, of South Carolina, and Judge Peters, of Moulton, Ala. The latter proved a most active contributor, exploring a region hitherto a veritable terra incognita to science, and affording further light on the distribution of fungi in this part of our continent.

His collections were chiefly made during the period from 1854 to

1864 in that part of the Tennessee Valley and of the mountain region of Alabama embracing Lawrence, Winston, and Walker counties. Peters submitted his collections to Curtis and also partly to Ravenel. The descriptions of his new species were published in the first to the third volumes of Grevillea (1872 to 1876) under the "Notice of North American Fungi," by Berkeley and Curtis, and a smaller number were issued in Ravenel's Fungi Caroliniani Exsiccati (1852 to 1860). In his manuscript catalogue of Alabama fungi, left, with his collection, to the University of Alabama, Peters enumerated a little over 500 species under 122 genera, most of them contained in three quarto volumes. These specimens are still in a fair state of preservation.

Early in the sixties G. A. Beaumont, an enthusiastic young botanist, joined Peters in the exploration of the cryptogamic flora of the State, but working in his own surroundings. After a short stay in Lawrence County, Beaumont collected in southeastern Alabama near Brooklyn, in Conecuh County, and Troy, in Pike County. His specimens were also forwarded to Mr. Curtis and were duly noticed in the publications of the authors named above.

After a long lapse of years the investigation of the mycological flora of the State was most actively resumed by Prof. George F. Atkinson (Cornell University, New York), chiefly during the years 1889 to 1892, while in charge of the biological department of the Polytechnic Institute and the State Agricultural Experiment Station at Auburn, assisted by some of his graduate students, principally B. M. Duggar, 1889–90, and C. L. Newman, 1890–91. The field work was chiefly confined to Lee County, and the results of his labors were published in the Bulletin of the Cornell University, vol. 3, No. 1, Ithaca, N. Y., June, 1897. In this Bulletin 644 species under 201 genera are enumerated, of which three genera and 61 species are described as new.

Prof. L. M. Underwood, while in connection with the biological department of the Polytechnic Institute (1895–96), and Prof. F. S. Earle, of the horticultural department, and since 1896 in the biological department of the same institution, continued with great zeal the labors of their predecessors in the field of Southern mycology. Their explorations were principally confined to the vicinity of the Institute. Professor Underwood made a trip to the mountain region of the State from its eastern limit westward to the section first explored by Peters. Professor Earle made, occasionally, some collections in Mobile County. His assistants in field work, Prof. C. F. Baker and Mr. Benton of the Alabama Experiment Station, are mentioned.

In 1897 appeared the Preliminary List of the known species of Alabama Fungi, by L. M. Underwood and F. S. Earle, as Bulletin No. 80 of the Alabama Experiment Station at Auburn. In this publication, as stated by the authors, are contained all the Alabama species referred to by Berkeley, all contained in the Peters collection, and those contributed by Peters and Beaumont to Ravenel's Exsiccati; besides these,

those collected by Professor Atkinson or his associates and deposited in the herbarium of the Alabama Polytechnic Institute, the material collected by G. W. Carver of the Tuskegee Normal and Industrial Institute in Macon County, and the species reported upon by the authors in later papers from material collected in 1895 and subsequently.

The following list of the Alabama fungi has been kindly furnished by Prof. F. S. Earle. The writer takes this occasion to express his gratitude for this valuable contribution to his catalogue of Alabama plants.

Introductory to this list Professor Earle makes the following remarks:

In the Preliminary List of Alabama Fungi, of Underwood and Earle, published during the summer of 1897[1] 1,110 species were noted as occurring in the State, and the distribution by counties was given. At about the same time Professor Atkinson published his list of 644 species, which appeared as Bulletin, Vol. 3, No. 1, of the Cornell University. Two hundred and thirty-two of the species were not given in Bulletin 80.

These two publications are the basis of the following list, though it contains a number of additional species not reported in either of them.

The nomenclature adopted is essentially that of Engler & Prantl, Die Natuerlichen Pflanzenfamilien. This necessitates the change for good reason of a few of the Saccardian generic names that were used in the above publication. The sequence of orders and families is that of Engler & Prantl's work, the genera and species being arranged alphabetically.

To this the writer has to add that, in order to bring his list into accord with the plan adopted in the present work, the genera had also to be systematically arranged according to the work of the above authors, and the authority for each genus had to be given. Further have been added citations for the more recently described species,[2] the names of collectors in Alabama, and the distribution of species by States, as far as could be ascertained from the various State floras, occurrence in Europe being also noted.

Division EUMYCETES. Fungi.

Class PHYCOMYCETES.

Order CHYTRIDIALES.

Family SYNCHYTRIACEAE.

SYNCHYTRIUM De Bary & Woronin.

Synchytrium decipiens Farlow.

Ala. Bull. 135.[3]
On *Falcata comosa*. Dekalb County, May, 1896 (*Underwood & Earle*).

---

[1] This Bulletin was dated April, 1897, but was not issued till about July 1.

[2] Except when the publication occurred in either the Alabama or the Cornell Bulletin.

[3] "Ala. Bull." denotes Bulletin No. 80 of the Alabama Agricultural Experiment station, referred to in the introduction.

Synchytrium fulgens Schroet.

Ala. Bull. 135.
On *Oenothera laciniata*. Lee County, April, 1896 (*Underwood & Earle*).
Europe.

Synchytrium pluriannulatum (B. & C.) Farlow.

Grevillea, 3:57, under Uromyces. Ala. Bull. 135.
On *Sanicula* sp. (*Peters*).

Order MUCORALES.

Family MUCORACEAE.

MUCOR (Micheli) Link.

Mucor beaumontii B. & C.

Grevillea, 3:148. Ala. Bull. 136.
On *Brassica oleracea* (*Beaumont*).

SPORIDINIA Link.

Sporidinia aspergillus (Scop.) Schroet.

Peters coll. No. 130, as *Mucor ramosus* Bull. Ala. Bull. 136.
On decaying *Boletus* sp. Lee County, July 10, 1896 (*Underwood*).
Europe.

Order SAPROLEGNIALES.

Family SAPROLEGNIACEAE.

SAPROLEGNIA Nees.

Saprolegnia declina Humph.

Cornell Bull. 14.[1]
On dead flies in water. Lee County, Auburn (*Atkinson*).

Saprolegnia monoica Pringsh.

Cornell Bull. 14.
On dead flies in water. Lee County, Auburn (*Atkinson*).
Europe.

ACHLYA Nees.

Achlya americana Humph.

Cornell Bull. 14.
On dead flies in water. Lee County, Auburn (*Atkinson*).

Achlya apiculata De Bary.

Cornell Bull. 14.
On dead flies in water. Lee County, Auburn (*Atkinson*).
Europe.

Achlya oblongata globosa Humph.

Cornell Bull. 14.
On dead flies in water. Lee County, Auburn (*Atkinson*).

Order PERONOSPORALES.

Family ALBUGINACEAE.

ALBUGO (Pers.) Kuntze. (CYSTOPUS Lév.)

Albugo amaranthi (Schw.) Kuntze.

Ala. Bull. 136. Cornell Bull. 14, as *Cystopus bliti* (Biv.) De Bary.
On leaves of *Amaranthus retroflexus*. Lee County, Auburn, June 20, 1890 (*Atkinson*).
On leaves of *Amaranthus spinosus*. Lee County, Auburn, June 20, 1890 (*Atkinson*).
On *Amaranthus* sp. Hale County, May, 1896 (*Underwood*); Lee County, July, 1896 (*Underwood & Earle*).

[1] "Cornell. Bull." denotes the Cornell University Bulletin, vol. 3, no. 1, referred to in the introduction.

Albugo candida (Pers.) Kuntze.

Ala. Bull. 136. Cornell Bull. 14, under Cystopus.
On *Arabis virginica*. Lee County, April, 1896 (*Underwood & Earle*).
On *Lepidium virginicum*. Lee County, March, 1890 (*R. S. Edwards*).
On *Senebiera* sp. Lee County, May, 1896 (*Underwood & Earle*).
On Lepidium, cultivated cress, etc. Lee County, Auburn (*Atkinson*).
Europe.

Albugo ipomoeae-panduratae (Schw.) Swingle.

Ala. Bull. 136. Cornell Bull. 14, under Cystopus.
On *Ipomoea batatas*. Lee County, Auburn, July, 1890 (*Atkinson*).
On *Ipomoea pandurata*. Lee County, July, 1896 (*Underwood & Earle*).
On *Ipomoea purpurea*. Lee County, June, 1890 (*Atkinson*).
On *Jacquemontia* (*Ipomoea*) *tamnifolia*. Lee County, July, 1896 (*Underwood & Earle*).

Albugo portulacae (DC.) Kuntze.

Ala. Bull. 136. Cornell Bull. 14, under Cystopus.
On leaves of *Portulaca oleracea*. Lee County, Auburn, July 3, 1890 (*Atkinson*).

Albugo tragopogonis (Pers.) S. F. Gray.

Ala. Bull. 136. Cornell Bull. 14, under Cystopus.
On leaves of *Ambrosia artemisiaefolia*. Montgomery County, Pike road, June, 1890 (*Atkinson*).
On *Tragopogon porrifolius*. Lee County, May 5, 1890 (*Atkinson*).
Europe.

Family PERONOSPORACEAE.

BASIDIOPHORA Roze & Cornu.

Basidiophora entospora Roze & Cornu.

Cornell Bull. 15.
On leaves of an *Aster* or an *Erigeron*. Lee County, Auburn, February, 1890 (*Atkinson*).
Europe.

BREMIA Regel.

Bremia lactucae Regel.

Cornell Bull. 15.
On leaves of *Lactuca* sp. Lee County, April, 1897 (*Earle & Baker*).
Europe.

PERONOSPORA Corda.

Peronospora alsinearum Caspary.

Cornell Bull. 15.
On leaves of *Cerastium* sp. Lee County, Auburn, February and December, 1890 (*Atkinson*).
Europe.

Peronospora alta Fkl.

Cornell Bull. 15.
On leaves of *Plantago* sp. Lee County, Auburn, April 17, 1890 (*Atkinson*).
Europe.

Peronospora arthuri Farlow.

Ala. Bull. 137. Cornell Bull. 15.
On leaves of *Oenothera laciniata*. Lee County, Auburn, March 24, 1890 (*Atkinson*).

Peronospora calotheca De Bary.

Cornell Bull. 15.
On leaves of *Houstonia patens*. Lee County, Auburn, March 23, April 15, 1890 (*Atkinson*).
Europe.

This is the same fungus mentioned below as *P. seymourii* Burrill. Both names are retained as it is impossible at present to decide which is the correct determination.

Peronospora lamii (Al. Braun) De Bary.

Ala. Bull. 137. Cornell Bull. 15.
On leaves of *Lamium amplexicaule*. Lee County, Auburn, January, 1890 (*R. S. Edwards*).
Europe.

Peronospora parasitica (Pers.) Fr.

Ala. Bull. 137. Cornell Bull. 15.
On *Brassica oleracea*. Mobile, March, 1896 (*Reese*).
On leaves of several species of Cruciferae. Lee County, Auburn, in late winter and early spring (*Atkinson*).
On *Cardamine hirsuta*. Macon County, 1897 (*Carver*).
Europe.

Peronospora plantaginis Underw.

Ala. Bull. 137.
On *Plantago aristata*. Lee County, May, 1896 (*Earle*).

Peronospora seymourii Burrill.[1]

Ala. Bull. 137.
On *Houstonia patens*. Lee County, March, 1896 (*Underwood & Earle*).

Peronospora trifoliorum De Bary.

Cornell Bull. 15.
On leaves of *Trifolium carolinianum*. Lee County, Auburn, December 27, 1891; January 24, 1892 (*Atkinson*).
Europe.

Peronospora violae De Bary.

On *Viola rafinesqii* (*V. tenella*). Lee County, February, 1890 (*Atkinson*); Lee County, April, 1897 (*Earle*).
On *Viola tricolor*, the cultivated pansy. Lee County, April, 1897 (*Earle*).
Europe.

PLASMOPARA Schroet.

Plasmopara geranii (Peck) Berl. & De Ton.

Ala. Bull. 137. Cornell Bull. 15.
On *Geranium carolinianum*. Lee County, Auburn, December to April, 1890 (*Atkinson*); Lee County, March, 1896 (*Underwood & Earle*).

Plasmopara halstedii (Farlow) Berl. & De Ton.

Ala. Bull. 137. Cornell Bull. 15.
In leaves of *Gnaphalium purpureum*. Lee County, Auburn, June, 1890 (*Atkinson*).
On *Bidens frondosa*. Lee County, August, 1890 (*Atkinson*).
In leaves of *Bidens* sp. Lee County, Auburn, August 27, 1891 (*Atkinson*).

Plasmopara obducens Schroet.

Ala. Bull. 137.
On *Impatiens aurea*. Lee County, April, 1896 (*Underwood & Earle*).
Europe.

Plasmopara viburni Peck.

On *Viburnum nudum*. Lee County, November, 1897 (*Earle*).

Plasmopara viticola (B. & C.) Berl. & De Ton. GRAPE MILDEW.

Ala. Bull. 137. Cornell Bull. 15.
On *Parthenocissus quinquefolia*. Dallas County, May, 1896 (*Underwood & Earle*).
On *Vitis* sp., various cultivated varieties. Lee County (*Atkinson*).
On *Vitis rotundifolia*. Lee County, October, 1890 (*Atkinson*).

Order ENTOMOPHTHORALES.

Family ENTOMOPHTHORACEAE.

EMPUSA Cohn.

Empusa apiculata Thaxter.

Cornell Bull. 14.
On a dipterous insect. Lee County, Auburn, January, 1890 (*Atkinson*).

Empusa muscae (Fr.) Cohn.

Ala. Bull. 136.
On dead flies. Lee County, May, 1896 (*Underwood & Earle*).
Europe.

---

[1] See note under *Peronospora calotheca*.

Class ASCOMYCETES.

Order EXOASCALES.

Family EXOASCACEAE.

EXOASCUS Fkl.

Exoascus alnitorquus (Tul.) J. Kuehn.

Ala. Bull. 175.
On *Alnus rugosa*. Lee County, 1890, April, 1891 (*Atkinson*); December, 1893 (*Duggar*); April, 1896 (*Underwood & Earle*).

Exoascus pruni Fkl.

Ala. Bull. 175.
On *Prunus serotina*. Lee County, 1891 (*Atkinson*).
On *Prunus angustifolia*. Lee County, 1890 (*Atkinson*).
New Jersey. Europe.

Exoascus deformans (Berk.) Fkl.

Cornell Bull. 13.
On leaves of *Amygdalus persica*, the peach. Lee County, Auburn (*Atkinson*).

Exoascus farlowii Sadebeck.

Ala. Bull. 175. Cornell Bull. 13.
On *Prunus serotina*. Lee County, Auburn, 1892 (*Atkinson*).

Exoascus australis Atkinson, Bull. Torr. Club, **21**: 379. 1894.

Ala. Bull. 175. Cornell Bull. 13.
On the leaves of *Carpinus caroliniana*. Lee County, Auburn, April 30, 1892 (*Atkinson*).

Exoascus mirabilis Atkinson.

Ala. Bull. 175. Cornell Bull. 13.
On *Prunus angustifolia*. Lee County, Auburn, April, May, 1890, 1892 (*Atkinson*).

Exoascus rhizipes Atkinson.

Ala. Bull. 175. Cornell Bull. 13.
On *Prunus triflora*, the Japanese plum. Lee County, Auburn (*Atkinson*).

Exoascus varius Atkinson, Bull. Torr. Club, **21**: 378. 1894.

Ala. Bull. 176.
On *Prunus serotina*. Lee County, Auburn, May, 1891 (*Atkinson*).

TAPHRIA Fr.

Taphria coerulescens (Mont.) Fkl.

Ala. Bull. 176. Cornell Bull. 13.
On *Quercus nigra* (*Q. aquatica*). Lee County, Auburn, 1892 (*Atkinson*).
On *Quercus phellos*. Lee County, Auburn, 1890 (*Atkinson*).
On *Quercus minor*. Lee County, Auburn, 1890 (*Atkinson*).
On *Quercus marilandica*. Lee County, Auburn, 1890 (*Atkinson*).
On *Quercus digitata*. Lee County, Auburn, 1890 (*Atkinson*).
On *Quercus rubra* (*Atkinson*.)
On *Quercus brevifolia*. Lee County, Auburn, 1891 (*Atkinson*).
New Jersey. Europe.

Taphria virginica Sadeb. & Seym.

Ala. Bull. 176.
On *Ostrya virginiana*. Lee County, May, 1896 (*Underwood & Earle*).

Order HELVELLALES.

Family GEOGLOSSACEAE.

MITRULA Pers

Mitrula phalloides (Bull.) Sacc.
Ala. Bull. 206.
(*Beaumont.*)
Damp soil in woods. Lee County, May, 1896 (*Underwood & Earle*).
Europe.

GEOGLOSSUM Pers.

Geoglossum peckianum Cooke.
Peters coll., as *G. glutinosum*. Ala. Bull. 206.
Winston County, 1862 (*Peters*).

LEPTOGLOSSUM (Cooke) Sacc.

Leptoglossum alabamense Underwood, Bull. Torr. Club, **24**: 82. 1897.
Ala. Bull. 206.
On the ground. Lee County, Auburn, July (*Underwood*).

Family HELVELLACEAE.

MORCHELLA Dill.

Morchella esculenta (L.) Pers.
Ala. Bull. 207.
In sandy pine woods. Mobile County, October (*Mohr*).
On the ground in low places. Lee County, March, 1896 (*Underwood & Earle*).
New Jersey. Europe.
The most esteemed of edible species.

Family RHIZINACEAE.

PSILOPEZIA Berk.

Psilopezia flavida B. & C.
Grevillea, **4**: 1. Ala. Bull. 206.
On wood of *Quercus alba* (*Peters*).

RHIZINA Fr.

Rhizina inflata (Schaeff.) Karst.
Ala. Bull. 206.
On the ground. Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Order PEZIZALES.

Family PEZIZACEAE.

LACHNEA Fr.

Lachnea scutellata (L.) Sacc.
Peters coll. **1**: 32. Ala. Bull. 202.
On decayed wood (*Peters*).
Winston County, June, 1896 (*Underwood*).
Europe.

SPHAEROSPORA Sacc.

Sphaerospora confusa Cooke.

Ala. Bull. 205.
On burnt ground in damp woods. Lee County, July, 1896 (*Underwood & Earle*).

PLICARIELLA Sacc.

Plicariella exasperata (B. & C.) Sacc.

Grevillea, **3**:152, under Peziza. Ala. Bull. 200, under Barlaea Sacc.
On burnt earth (*Peters*).

PEZIZA Dill.

Peziza acetabulum L.

Ala. Bull. 200, under Acetabula.
On ground in pine woods. Lee County, April, 1896 (*Underwood & Earle*).
Ohio, New Jersey. Europe.

Peziza spissa Berk.

Grevillea, **3**:152. Ala. Bull. 202, under Humaria.
On the ground (*Peters*).

Peziza macropus Pers.

Peters coll. **3**:17. Ala. Bull. 203, under Macropodia.
July, 1855 (*Peters*).
South Carolina, New Jersey. Europe.

Peziza pubida B. & C.

Ala. Bull. 203, under Macropodia.
On the ground (*Peters*).

Peziza schweinitzii Sacc.

Ala. Bull. 203, under Macropodia.
Lee County (*Atkinson*).

Peziza aurantia Pers.

Peters coll. Ala. Bull. 204.
On the ground. Lawrence County, November, 1864 (*Peters*); Lee County, December, 1896 (*Earle*).

Peziza badia Pers.

Ala. Bull. 204.
On the ground. Lee County, March, 1896 (*Underwood & Earle*).
New Jersey.

Peziza chlora Schw.

Rav. Fung. Car. Exsic. **5**:39. Ala. Bull. 204.
(*Peters.*)

Peziza cochleata L.

Peters coll. **1**:26. Ala. Bull. 204.
(*Peters.*)

Peziza decolorans B. & C.

Grevillea, **3**:150. Ala. Bull. 204.
On the ground (*Peters*).

Peziza petersii Berk.

Grevillea, **3**:150. Ala. Bull. 205.
On burnt ground (*Peters*).

Peziza vesiculosa Bull.

Lee County, Auburn, January 8, 1899 (*Mrs. F. S. Earle*).
New England, New Jersey. Europe.

OTIDEA Pers.

Otidea euplectra Cooke.

Grevillea, **3**:151, as *Peziza phlebophora* B. & Br. var. Ala. Bull. 204.
On moist sandy soil (*Peters*).

Family ASCOBOLACEAE.

ASCOBOLUS Pers.

Ascobolus brunneus Cooke.
Ala. Bull. 200.
On cow dung. Lee County, January, 1896 (*Underwood & Earle*).

Family HELOTIACEAE.

BELONIUM Sacc.

Belonium eustegiaeforme (B. & C.) Sacc.
Rav. Fung. Am. Exsic. 310, under Peziza. Ala. Bull. 200. Cornell Bull. 13.
On dead canes of *Arundinaria tecta*. Macon County, Shorter, July 16, 1890 (*Atkinson*); Lee County, January, 1896 (*Underwood & Earle*).
South Carolina.

CHLOROSPLENIUM Fr.

Chlorosplenium versiforme (Pers.) Karst.
Grevillea, **3**: 160. Ala. Bull. 202.
On *Quercus* sp. (*Peters*).

SARCOSCYPHA Fr.

Sarcoscypha occidentalis (Schw.) Sacc.
Grevillea, **3**: 153. Ala. Bull. 205.
On the ground (*Peters*).
New York, Ohio.

LACHNELLA Karst.

Lachnella extricata (B. & C.) Sacc.
Peters coll. Grevillea, **3**: 152. Ala. Bull. 202.
On some umbelliferous plant (*Peters*).

LANZIA Sacc.

Lanzia rugipes (Peck) Sacc.
Ala. Bull. 203.
Lee County (*Atkinson*).

OMBROPHILA Fr.

Ombrophila decolorans (B. & C.) Sacc.
Grevillea, **4**: 6, under Bulgaria. Ala. Bull. 203.
On decayed wood of Quercus (*Peters*).

DASYSCYPHA Fr.

Dasyscypha arundinariae (Berk.) Sacc.
Ala. Bull. 202. Cornell Bull. 13.
On Arundinaria. Lee County, May, 1896 (*Underwood & Earle*).

Dasyscypha calycina (Schum.) Fkl.
Peters Coll. **3**: 16. Ala. Bull. 202.
On Pinus (*Peters*).
Europe.

Dasyscypha leucoderma (Berk.) Rehm.
Ala. Bull. 202.
On Pinus. Lee County, March, July, 1896 (*Underwood & Earle*).

ERINELLA Sacc.

Erinella sp.
Peters coll. **1**:28, as *Peziza alboviolacea* A. & S. Ala. Bull. 202.
On Magnolia (*Peters*).

HYMENOSCYPHA Fr.

Hymenoscypha sacchariferum (Berk.) Link.
Grevillea, **3**:157, under Peziza. Ala. Bull. 205, as *Pseudohelotium sacchariferum* (Berk.) Sacc.
On Liquidambar (*Peters*).

Hymenoscypha soleniiformis (B. & C.)
Grevillea, **3**:160, under Peziza. Ala. Bull. 205, under Pezizella.
On dead wood (*Peters*).

Hymenoscypha (**Phialea**) **cyathoidea** (Bull.) Gill.
Grevillea, **3**:160, under Peziza. Ala. Bull. 205.
(*Peters.*)
Canada, New England, Pennsylvania, New Jersey.

Hymenoscypha translucens Gill.
Cornell Bull. 13, under Pezizella.
On decaying wood. Macon County, Shorter, July 16, 1890 (*Atkinson*); Lee County, Auburn, winter 1891.

Hymenoscypha (**Phialea**) **fructigena** (Bull.) Gill.
Ala. Bull. 205.
On hickory shells. Lee County (*Atkinson*).

Family MOLLISIACEAE.

BELONIDIUM Mont. & Dur.

Belonidium aurelia (Pers.) De Not.
Rav. Fung. Car. Exsic. **5**:41, under Peziza. Ala. Bull. 200.
On Liriodendron (*Peters*).
Pennsylvania, South Carolina. Europe.

NIPTERA Fr.

Niptera atro-fusca (B. & C.) Underwood & Earle.
Grevillea, **3**:156, under Peziza. Ala. Bull. 203.
On dead wood (*Peters*).

ORBILIA Fr.

Orbilia vinosa (A. & S.) Karst.
Peters coll. **3**:26. Ala. Bull. 204.
On Liriodendron (*Peters*).
South Carolina. Europe.

PYRENOPEZIZA Fkl

Pyrenopeziza atrata (Pers.) Fkl.
Grevillea, **3**:159, under Peziza. Ala. Bull. 205.
On Solidago (*Peters, Beaumont*).

OMBROPHILA Sacc.

Ombrophila decolorans (B. & C.) Sacc.
Grevillea, **4**:6, under Bulgaria. Ala. Bull. 203.
On Quercus (*Peters*).

Family CELIDIACEAE.

AGYRIUM Fr.

Agyrium brunneolum B. & C.
Grevillea, **4**:6. Ala. Bull. 200.
On roots of pine (*Beaumont*).

Agyrium rufum (Pers.) Fr.
Grevillea, **4**:6. Ala. Bull. 200.
On dead wood of *Tsuga canadensis*. Winston County (*Peters*).
Europe.

Family PATELLARIACEAE.

HYSTEROPATELLA Rehm.

Hysteropatella prostii (Duby) Rehm.
Ala. Bull. 197, under Hysterium.
On *Quercus*. Lee County, February, 1896 (*Underwood & Earle*).
Europe.

PATELLARIA Fr.

Patellaria atrata (Hedw.) Fr.
Ala. Bull. 203, under Lecanidion.
On Liriodendron. Lee County, February, 1896 (*Underwood & Earle*).
New Jersey. Europe.

PATINELLA Sacc.

Patinella inquinans (Cooke) Sacc.
Ala. Bull. 204.
On dead wood. Lee County, March, 1896 (*Underwood & Earle*).

Family CENANGIACEAE.

CENANGELLA Sacc.

Cenangella ravenelii (Berk.) Sacc.
Grevillea, **4**:3, under Tympanis. Ala. Bull. 200.
On *Ilex prinoides* (*Peters*).

CENANGIUM Fr.

Cenangium cephalanthi (Schw.) Fr.
Grevillea, **4**:4. Ala. Bull. 200.
On *Cephalanthus occidentalis* (*Peters*).

Cenangium contortum B. & C.
Peters coll. **1**:149. Ala. Bull. 201.
On dead wood (*Peters*).

Cenangium magnoliae B. & C.
Grevillea, **4**:5. Ala. Bull. 201.
On Persea (*Beaumont*).
On Laurus (*Peters*).

Cenangium leptospermum B. & C.
Grevillea, **4**:5. Ala. Bull. 201.
On *Tsuga canadensis*. Winston County (*Peters*).

Cenangium ustale (B. & C.) Sacc.
Grevillea, **3**:152, under Peziza. Ala. Bull. 201.
On decayed twigs (*Peters*).

BULGARIA Fr.

Bulgaria inquinans (Pers.) Fr.
Rav. Fung. Car. Exsic. **5**:43. Ala. Bull. 200.
On *Quercus velutina*. Lawrence County (*Peters*).
Georgia to New Jersey. Europe.

DERMATEA Fr.

Dermatea rubi (Lib.) Rehm.
Grevillea, **4**:2, as *Patellaria rhabarbarina* Berk. Ala. Bull. 204, as *Pezicula rhabarbarina* (Berk.) Tul.
On *Cornus amomum* (*Peters*).
Europe.

TRYBLIDIELLA Sacc.

Tryblidiella rufula (Spreng.) Sacc.
Peters coll. **3**:66. Ala. Bull. 198.
On Rhus (*Peters, Beaumont*).
On dead twigs. Lee County, January, 1896 (*Underwood & Earle*).

Tryblidiella rufula microspora (E. & E.) Underwood & Earle.
Ala. Bull. 198.
On *Melia azedarach*. Lee County, March, 1896 (*Underwood & Earle*).

Order PHACIDIALES.

Family STICTIDACEAE.

XYLOGRAMMA Wallr.

Xylogramma graminis Atkinson.
Cornell Bull. 14.
On stems of *Chrysopogon avenaceus*. Lee County, Auburn, November 1, 1891 (*Duggar*).

Family TRYBLIDIACEAE.

SCLERODERRIS Fr.

Scleroderris arundinariae Atkinson.
Cornell Bull. 14.
On dead canes of *Arundinaria tecta*. Lee County, Auburn, July 27, 1890 (*Atkinson*).

Scleroderris concinna (B. & C.) Sacc.
Grevillea, **4**:5, under Cenangium. Ala. Bull. 199.
On Sassafras (*Peters*).
South Carolina.

URNULA Fr.

Urnula craterium (Schw.) Fr.
Ala. Bull. 206.
On the ground. Lee County, March, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

Family PHACIDIACEAE.

DOTHIORA Fr.

Dothiora asterinospora (E. & E.) Sacc.
Rav. Fung. Car. Exsic. **3**:36, as *Tympanis pinastra* B. & C. Ala. Bull. 199.
On Ilex (*Peters*).
On living bark of various trees. Lee County, January, February, March, 1896 (*Underwood & Earle*).

PHACIDIUM Fr.

Phacidium brunneolum Peck.
On Galium. Lee County, Auburn, 1897 (*Earle & Baker*).

Phacidium elegantissimum B. & C.
Grevillea, **4**: 8. Ala. Bull. 199.
On leaves of *Ilex opaca* (*Peters*).

COCCOMYCES De Not.

Coccomyces juniperi Karst. (?).
Peters coll. **1**: 150, as *Rhytisma petersii* B. & C. Ala. Bull. 198.
On bark of Juniperus (*Peters*).

Coccomyces triangularis (Schw.) Sacc.
Ala. Bull. 198.
On oak. Lee County, April, 1896 (*Underwood & Earle*).

RHYTISMA Fr.

Rhytisma acerinum (Pers.) Fr.
Ala. Bull. 199. Cornell Bull. 13.
On *Acer rubrum*. Lee County, Auburn, July 22, 1891 (*Duggar & Newman*); November, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*); October, 1896 (*Earle*).
Ohio, New Jersey. Europe.

Rhytisma curtisii B. & Rav.
Ala. Bull. 199. Cornell Bull. 14.
On leaves of *Ilex opaca*. Lee County, Auburn, September 13, 1891 (*Atkinson*); Lee County, April, 1896 (*Underwood & Earle*).
South Carolina.

Rhytisma solidaginis Schw.
Ala. Bull. 198. Cornell Bull. 14.
On *Solidago canadensis*. Lee County, 1891 (*Newman*).
On various species of Solidago. Lee County, Auburn (*Atkinson*).
New York, New Jersey.

Rhytisma ilicis-canadensis Schw.
On *Ilex verticillata*. Lee County, Auburn, November, 1897 (*Earle*).

Rhytisma vaccinii (Schw.) Fr.
Ala. Bull. 199. Cornell Bull. 14.
On living leaves of *Vaccinium arboreum*. Lee County, Auburn, 1891 (*Atkinson*).
South Carolina, New Jersey.

Rhytisma tostum B. & C.
Grevillea, **4**: 9. Ala. Bull. 199.
On leaves of *Quercus laurifolia* (*Beaumont*).

Rhytisma decolorans Fr.
Ala. Bull. 199.
On *Xolisma ligustrina*. Lee County, January, 1896 (*Underwood & Earle*); Macon County, August, 1896 (*Carver*).

Order HYSTERIALES.

Family HYPODERMATACEAE.

HYPODERMA DC.

Hypoderma ilicinum De Not.
Ala. Bull. 197.
On dead leaves of *Quercus* sp. Lee County, January, 1896 (*Underwood & Earle*).
On *Quercus nigra* (*Q. aquatica*). Lee County, July, 1896 (*Underwood & Earle*).

ANGELINA Fr.

Angelina rufescens (Schw.) Duby.
Rav. Fung. Car. Exsic. **5**: 44, as *Ascobolus conglomeratus* Schw. Ala. Bull. 196.
On Quercus (*Peters*).
South Carolina, New Jersey.

LOPHODERMIUM Chev.

Lophodermium arundinaceum (Schrad.) Chev.
Ala. Bull. 198.
On *Arundinaria* sp. Lee County, January, 1896 (*Underwood & Earle*).

Lophodermium culmigenum (Fr.) Karst.
Ala. Bull. 198.
On dead sheaths of Arundinaria. Lee County, January, 1896 (*Underwood & Earle*).
Pennsylvania.

Lophodermium cyrillicolum Tracy & Earle.
Ala. Bull. 198.
On *Cyrilla racemiflora*. Lee County, April, 1896 (*Underwood & Earle*).

Lophodermium petersii (B. & C.) Sacc.
Grevillea, **4**: 13, under Hysterium. Ala. Bull. 198.
On Juniperus (*Peters*).

Lophodermium pinastri (Schrad.) Chev.
Ala. Bull. 198.
On dead needles of *Pinus echinata*. Lee County, March, 1896 (*Underwood & Earle*).

Lophodermium rubiicolum Earle, Bull. Torr. Club. **25**: 365. 1898.
On Rubus. Lee County, March, 1896 (*Underwood & Earle*).

RHYTIDHYSTERIUM Speg.

Rhytidhysterium scortichinii Sacc. & Berl.
Cornell Bull. 12.
On *Toxylon pomiferum* (*Maclura aurantiaca*). Hale County, Gallion, August 14, 1894 (*Duggar*).

Family DICHAENACEAE.

DICHAENA Fr.

Dichaena faginea (Pers.) Fr.
Ala. Bull. 196.
On *Fagus americana* (*F. ferruginea*). Lee County, March, 1896 (*Underwood & Earle*).
Ohio. Europe.

Dichaena sp.
Grevillea, **4**: 158. Ala. Bull. 196.
On Quercus (*Peters*).

Family HYSTERIACEAE.

AULOGRAPHUM Libert.

Aulographum confluens Earle.
On dead stems of Rubus. Lee County, February, 1896 (*Underwood & Earle*).

Aulographum pinorum Desm.
Ala. Bull. 196.
On pine needles. Lee County, January, 1891.

GLONIUM Muhl.

Glonium chlorinum (B. & C.) Sacc.
Grevillea, **4**: 12, under Hysterium. Ala. Bull. 197.
On *Quercus nigra* (*Q. aquatica*) (*Beaumont*).

Glonium lineare angustissimum De Not.
Ala. Bull. 197.
On Liquidambar. Lee County, March, 1896 (*Underwood & Earle*).

Glonium macrosporum Tracy & Earle.
Ala. Bull. 197.
On *Prunus serotina*. Lee County, February, 1896 (*Underwood & Earle*).
On *Vitus rotundifolia*. Lee County, February, 1896 (*Underwood & Earle*).
On *Rubus argutus* (*R. villosus*). Lee County, April, 1896 (*Underwood & Earle*).

Glonium parvulum (Ger.) Sacc.
Ala. Bull. 197.
On Liriodendron. Lee County, February, 1896 (*Underwood & Earle*).
On Hicoria. Lee County, February, 1896 (*Underwood & Earle*).

Glonium stellatum Muhl.
Rav. Fung. Car. Exsic. **3**: 43. Ala. Bull. 197.
(*Beaumont.*)
On rotten log. Lee County, January, 1896 (*Underwood & Earle*).
South Carolina, North Carolina, Ohio.

HYSTERIUM Tode.

Hysterium erianthicola Atkinson.
Cornell Bull. 13.
On *Erianthus* sp. Lee County, Auburn, September 26, 1891 (*Atkinson*).

Hysterium insidens Schw.
Ala. Bull. 197.
On dead wood. Lee County, February, 1896 (*Underwood & Earle*).

Hysterium macrosporum Peck.
Ala. Bull. 197.
On weathered pine wood. Lee County, February, March, 1896 (*Underwood & Earle*).

Hysterium pulicare Pers.
Ala. Bull. 197.
On Betula. Macon County, April, 1896 (*Underwood*).
Europe.

HYSTEROGLONIUM Rehm.

Hysteroglonium curtisii Duby.
Ala. Bull. 196, under Gloniella Sacc.
On dead stems of Vitis. Lee County, July, 1896 (*Underwood & Earle*).

HYSTEROGRAPHIUM Corda.

Hysterographium mori (Schw.) Rehm.
Ala. Bull. 198.
On Gleditsia. Lee County, February, 1896 (*Underwood & Earle*).

Hysterographium smilacina (Schw.).
Ala. Bull. 196, as *Gloniopsis smilacis* (Schw.) Underwood & Earle.
On Smilax. Lee County, 1896.

Hysterographium vulvatum (Schw.) Rehm.
Ala. Bull. 198.
On *Quercus* sp. Lee County, February, 1896 (*Underwood & Earle*).
On *Vitis rotundifolia*. Lee County, February, 1896 (*Underwood & Earle*).

Hysterographium praelongum (Schw.) E. & E.
Ala. Bull. 196, as *Gloniopsis praelongum* (Schw.) Underwood & Earle.
On Morus. Lee County, April, 1896 (*Underwood & Earle*).

LEMBOSIA Lév.

Lembosia angustifolia Tracy & Earle.
On *Ilex coriacea*. Escambia County, Flomaton, August 8, 1898 (*S. M. Tracy*).

Lembosia illiciicola Tracy & Earle.
Ala. Bull. 198.
On *Illicium floridanum*. Mobile County, March, 1896 (*Earle*).

LOPHIDIUM Karst.

Lophidium anomalum Atkinson.
Cornell Bull. 12.
On culms of Erianthus. Lee County, Auburn, November 12, 1891 (*Duggar*).

Family ACROSPERMACEAE.

ACROSPERMUM Tode.

Acrospermum foliicolum Berk.
On fallen leaves of Ulmus. Lee County, February, 1897 (*Earle & Baker*).

Order PLECTASCALES (Aspergillales).

Family ASPERGILLACEAE.

ASPERGILLUS Micheli.

Aspergillus glaucus (L.) Link.
Cornell Bull. 38.
On decaying leaves of Ipomoea. Lee County, Auburn, July 23, 1890 (*Atkinson*). Common.

MELIOLA Fr.

Meliola amphitricha Fr.
Ala. Bull. 182.
On *Osmanthus americana*. Lee County, October, 1896 (*Earle*).

Meliola bidentata Cooke.
Ala. Bull. 182. Cornell Bull. 4.
On *Bignonia capreolata*. Lee County, Auburn, September 5, 1891 (*Duggar*); Mobile County, March, 1896 (*Earle*).

Meliola manca E. & M.
Ala. Bull. 182. Cornell Bull. 4.
On leaves of *Rubus argutus* (*R. villosus*). Lee County, Auburn, October, 1891 (*Atkinson*).
On leaves of *Myrica cerifera*. Mobile County, March, 1896 (*Earle*).

Meliola martiniana Gaill.
Ala. Bull. 182.
On *Persea palustris*. Lee County, April, 1896 (*Underwood & Earle*).

Meliola mitchellae Cooke.
Ala. Bull. 182.
On *Mitchella repens*. Lee County, March, 1896 (*Underwood & Earle*).

Meliola nidulans (Schw.) Cooke.
Ala. Bull. 182. Cornell Bull. 4.
On living twigs of *Cornus* sp. Lee County, Auburn, November 8, 1891 (*Atkinson*).
Lee County, April, 1896 (*Underwood & Earle*).

Meliola palmicola Winter.
Grevillea, **4**: 158, as *Meliola amphitricha*. Ala. Bull. 182.
On *Sabal* sp. (*Beaumont*).

Meliola tenuis B. & C.
Ala. Bull. 182. Cornell Bull. 4.
On leaves of *Arundinaria tecta*. Lee County, Auburn, October, November, 1891 (*Atkinson*).

Order PERISPORIALES.

Family ERYSIBACEAE.

SPHAEROTHECA Lév.

Sphaerotheca castagnei Lév.

Ala. Bull. 180. Cornell Bull. 4.
On *Bidens frondosa*. Lee County, Auburn, October, 1889 (*Atkinson*); November, 1891 (*Duggar*).
On leaves of *Erechtites hieracifolia*. Lee County, November 5, 1891 (*Benton & Duggar*).
On *Lactuca* sp. Lee County, October, 1896 (*Earle*).
Ohio, New Jersey. Europe.

Sphaerotheca humuli (DC.) Burrill.

Cornell Bull. 4.
On Humulus, the hop. Lee County, Auburn, autumn, 1889 (*Atkinson*).

Sphaerotheca lanestris Hark.

Ala. Bull. 180. Cornell Bull. 4.
On leaves of *Quercus alba*. Lee County, Auburn, August 21, December, 1891 (*Atkinson*).

Sphaerotheca pannosa (Wallr.) Lév.

Ala. Bull. 180.
On a cultivated species of Rosa. Lee County, 1890 (*Atkinson*).
Europe.

PODOSPHAERA Kunze.

Podosphaera biuncinata C. & P.

Ala. Bull. 179. Cornell Bull. 5.
On leaves of *Hamamelis virginiana*. Lee County, October 28, 1891 (*Duggar*).

Podosphaera oxyacanthae (DC.) De Bary.

Grevillea, **4** : 158, as *Podosphaera kunzei* Lév. Ala. Bull. 180. Cornell Bull. 5.
On *Prunus cerasus* (*Peters*).
On *Crataegus* sp. Lee County, Auburn, November, 1891 (*Benton*).
On leaves of *Prunus americana*. Lee County, Auburn, October 31, 1891 (*Duggar*).
On *Malus malus*. Lee County, April, 1896 (*Earle*).
Europe.

ERYSIBE Hedw.

Erysibe cichoracearum DC.

Ala. Bull. 176. Cornell Bull. 4.
On *Ambrosia artemisiaefolia*. Lee County, May, 1890 (*Atkinson*).
On *Ambrosia trifida*. Perry County, 1890 (*Atkinson*).
On *Aster lateriflorus* and *A. tradescanti*. Lee County, Auburn, 1891 (*Atkinson*).
On *Helianthus annuus*. Lee County, 1891 (*Duggar*).
On *Willughbya scandens*. Lee County, 1891 (*Atkinson*).
On *Phlox* sp Mobile County, 1890 (*Carl Zimmer*).
On *Solanum carolinense*. Lee County, October, 1891 (*Atkinson*); Macon County, October, 1890 (*Carver*).
On *Verbena urticaefolia*. Lee County, October, 1891 (*Duggar*).
On *Xanthium canadense*. Lee County, October, 1889 (*Atkinson*); Macon County, August, 1896 (*Carver*).
Over the State, and north to Canada.
Europe.

Erysibe communis (Wallr.) Link.

Ala. Bull. 177. Cornell Bull. 4.
On *Onagra biennis*. Lee County, May, 1890 (*Atkinson*).
On *Pisum sativum*. Lee County, May, 1890 (*Atkinson*).
On leaves of *Oenothera laciniata*. Lee County, Auburn, June 3, 1890 (*Atkinson*).
Europe.

Erysibe liriodendri Schw.

Ala. Bull. 177. Cornell Bull. 5.
On leaves of *Liriodendron tulipifera*. Lee County, Auburn, October 28, 1891 (*Duggar*).
Europe.

MICROSPHAERA Lév.

Microsphaera alni (DC.) Winter.

Ala. Bull. 177. Cornell Bull. 5, as *M. semitosta* B. & C.
On *Alnus rugosa*. Lee County, 1891 (*Atkinson*).
On *Ilex* sp. Lee County, 1891 (*Atkinson*).
On *Hicoria* sp. Lee County, 1890 (*Atkinson*).
On *Platanus occidentalis*. Lee County, 1891 (*Atkinson*).
On *Syringa vulgaris*. Lee County, October, 1896 (*Earle*); Macon County, August, 1896 (*Carver*); Bullock County, Union Springs (*J. L. Moulton*).
On *Tecoma radicans*. Lee County, 1891 (*Atkinson*).
New Jersey, Ohio. Europe.

Microsphaera diffusa C. & P.

Ala. Bull. 177. Cornell Bull. 5.
On *Meibomia* sp. Lee County, 1889 (*Atkinson*).
On *Lespedeza striata*. Lee County, 1889 (*Atkinson*); Macon County, October, 1896 (*Carver*).

Microsphaera erineophila Peck.

Ala. Bull. 178.
On Erineum of Fagus. Lee County, March, 1896 (*Earle*).

Microsphaera euphorbiae B. & C.

Ala. Bull. 178. Cornell Bull. 5.
On *Euphorbia nutans*. Lee County, Auburn, October 21, 1891 (*Duggar*).

Microsphaera grossulariae (Wallr.) Lév.

Ala. Bull. 178. Cornell Bull. 5.
On *Sambucus canadensis*. Lee County, Auburn, October 13, 1891 (*Atkinson*).

Microsphaera quercina (Schw.) Burrill.

Ala. Bull. 178. Cornell Bull. 5.
On *Quercus nigra* (*Q. aquatica*). The form *M. calocladophora* Atkinson. Lee County, December, 1890 (*Atkinson*); Macon County, August, 1896 (*Carver*).
On *Quercus phellos*. Lee County, 1891 (*Atkinson*).
On *Quercus* sp. Lee County, 1895 (*Earle*).
On leaves of *Quercus marilandica, Q. minor, Q. rubra*, etc. Lee County, Auburn (*Atkinson*).
New Jersey, Ohio.

Microsphaera ravenelii Berk.

Ala. Bull. 179.
On *Apios apios*. Lee County, October, 1896 (*Earle*); Macon County, August, 1896 (*Carver*).

Microsphaera semitosta B. & C.

Ala. Bull. 179. Cornell Bull. 5.
On leaves of *Cephalanthus occidentalis*. Lee County, Auburn, 1891 (*Atkinson*).

Microsphaera vaccinii C. & P.

Ala. Bull. 179. Cornell Bull. 5.
On *Vaccinium* sp. Lee County, October 18, 1891 (*Duggar*).
On *Xolisma ligustrina*. Lee County, October 10, 1896 (*Earle*).

UNCINULA Lév.

Uncinula circinata C. & P.

Ala. Bull. 180.
On *Acer rubrum*. Lee County, 1891 (*Atkinson*).

Uncinula flexuosa Peck.

Ala. Bull. 180. Cornell Bull. 5.
On *Aesculus pavia*. Lee County, Wright's Mill, near Auburn, July, August, 1890 (*Atkinson*).

Uncinula geniculata Ger.

Ala. Bull. 180.
On *Morus rubra*. Lee County, 1891 (*Atkinson*).

Uncinula macrospora Peck.

Ala. Bull. 180. Cornell Bull. 5.
On leaves of *Ulmus americana*. Lee County, Auburn, August 6, 1890 (*Atkinson*).

Uncinula necator (Schw.) Burrill.

Ala. Bull. 180. Cornell Bull. 5.
On cultivated species of Vitis, the grape. Lee County, Auburn, 1889 (*Atkinson*). Ohio.

Uncinula parvula C. & P.

Ala. Bull. 180.
On *Celtis occidentalis*. Lee County, 1889; Montgomery County, 1891 (*Atkinson*); Macon County, August, 1896 (*Carver*).

Uncinula polychaeta (B. & C.) Mass.

Rav. Fung. Car. Exsic. **4**:68. Grevillea, **4**:159, under Erysiphe. Ala. Bull. 180.
On *Celtis occidentalis* (*Peters*). 1891 (*Atkinson*).

PHYLLACTINIA Lév.

Phyllactinia suffulta (Reb.) Sacc.

Grevillea, **4**:158, as *Phyllactinia guttata* Lév. Ala. Bull. 179. Cornell Bull. 5.
On Fagus (*Beaumont*).
On *Alnus rugosa*. Lee County, 1891 (*Atkinson*); Macon County, October, 1896 (*Carver*).
On *Cornus florida*. Lee County, November 3, 1891 (*Atkinson*).
On *Carpinus caroliniana*. Lee County, 1891 (*Atkinson*).
On *Crataegus* sp. Lee County, 1891 (*Atkinson*).
On *Liriodendron tulipifera*. Macon County, October, 1896 (*Carver*).
On *Quercus nigra* (*Q. aquatica*). Lee County, February, December, 1890 (*Atkinson*); Macon County, August, 1896 (*Carver*).
On *Quercus marilandica* (*Q. nigra*). Lee County 1890 (*Atkinson*).
On *Quercus phellos*. Lee County, December, 1890 (*Atkinson*).
On *Quercus minor*. Lee County, November, 1895 (*Earle*).
On leaves of *Ulmus alata*. Lee County, 1890 (*Atkinson*); Macon County, October, 1896 (*Carver*).
On leaves of *Ulmus americana*. Macon County, October, 1896 (*Carver*).
New Jersey, Ohio, Nebraska. Europe.

Family PERISPORIACEAE.

DIMEROSPORIUM Fkl.

Dimerosporium erysipheoides E. & E.

Cornell Bull. 4.
On leaves of *Panicum rostratum* (*P. anceps*). Lee County, Auburn, August 24, 1891 (*Atkinson*).

PARODIELLA Speg.

Parodiella perisporioides (B. & C.) Speg.

Ala. Bull. 182.
On *Meibomia* sp. Lee County, 1891 (*Newman & Duggar*).

PERISPORIUM Fr.

Perisporium zeae Desm. (?)

Rav. Fung. Car. Exsic. **3**:65. Ala. Bull. 182.
On *Zea mays* (*Beaumont*).

SCORIAS Fr.

Scorias spongiosa (Schw.) Fr.

Ala. Bull. 183.
On *Alnus rugosa*. Lee County, February, 1896 (*Earle*).
On *Fagus americana*. Lee County, July, 1896 (*Underwood & Earle*).

ANTENNARIA Link.

Antennaria semiovata B. & Br.
Ala. Bull. 182.
On *Magnolia virginiana* (*M. glauca*) (*Beaumont*).

APIOSPORIUM Kunze.

Apiosporium elongatum B. & Desm.
Ala. Bull. 181, under Capnodium.
On Bignonia (*Peters*).

Apiosporium sp.
Ala. Bull. 181, as *Capnodium* sp.
On *Chrysanthemum* sp. Lee County, 1889 (*Atkinson*).
On *Nerium oleander*. Lee County, 1890 (*Atkinson*).

Family MICROTHYRIACEAE.

ASTERINA Lév.

Asterina comata B. & Rav.
Grevillea, **4**:10. Ala. Bull. 181.
On leaves of *Magnolia virginiana* (*M. glauca*) (*Peters*). Mobile County, March, 1896 (*Earle*); Lee County, May, 1896 (*Underwood & Earle*).
South Carolina.

Asterina diplodioides B. & C.
Grevillea, **4**:9. Ala. Bull. 181.
On Leucothoe, probably *L. catesbaei*, cited as *Andromeda acuminata* (*Peters*).

Asterina pelliculosa Berk.
Grevillea, **4**:10. Ala. Bull. 181. Cornell Bull. 4, as *Dimerosporium orbiculare* B. & C.
On leaves of *Ilex opaca*. Lee County, Auburn, December 20, 1891 (*Atkinson*); Lee County, February, April, 1896 (*Earle*).

Asterina spurca B. & C.
Grevillea, **4**:10. Ala. Bull. 181.
On leaves and stems of *Mesosphaerum rugosum* (*Hyptis radiata*). Southern Alabama (*Beaumont*).

MICROPELTIS Mont.

Micropeltis alabamensis Earle, Bull. Torr. Club, **25**:359. 1898.
On *Magnolia acuminata*. Lee County, April, 1896 (*Underwood & Earle*).

Order HYPOCRAEALES.

Family HYPOMYCETACEAE.

HYPOMYCES Fr.

Hypomyces aurantius (Pers.) Fkl.
On *Polyporus resinosus*. Lee County, Auburn, February 22, 1896 (*Underwood & Earle*).
The specimen reported under this name in the Alabama Bulletin, 185, should be referred to the following. See Bulletin Torrey Botanical Club, **25**:363.

Hypomyces lactifluorum (Schw.) Tul.
Rav. Fung. Car. Exsic. **5**:64, as *H. aurantius*. Ala. Bull. 185. Cornell Bull. 10.
On *Cantherellus aurantiacus* (*Peters*).
On various species of Lactarius and Russula. Lee County, Auburn, August, 1890 (*Atkinson*); Lee County, December, 1895 (*Earle*); Winston County, June, 1896 (*Underwood*).

Hypomyces xylophilus Peck.
Ala. Bull. 185.
On rotten wood. Lee County, November, 1896 (*Earle*).
Ohio.

CALONECTRIA De Not.

Calonectria curtisii (Berk.) Sacc. (?).
Ala. Bull. 183.
On *Arundinaria* sp. Lee County, January, 1896 (*Underwood & Earle*).

Calonectria polythalama Berk.
Grevillea, **4**:46, as Nectria. Ala. Bull. 183.
On Liquidambar (*Peters*).

Family MELANOSPORACEAE.

NEOCOSMOSPORA E. F. Smith.

Neocosmospora vasinfecta (Atkinson) J. G. Smith.
Ala. Bull. 158. Cornell Bull. 48. In both under Fusarium.
In vascular ducts of stems of *Gossypium herbaceum*. Montgomery County, Mathews, June 16, 1891; Hope Hull, June 17, 1891; Pikeroad, July 9, 1891; near Montgomery, September 4, 1891 (*Atkinson*). Dallas County, Selma, 1892 (*Atkinson*).
In *Hibiscus esculentus*. Limestone County, Athens, 1891 (*Atkinson*).
On *Vigna catjang* (cowpea) and *Phaseolus vulgaris* (garden bean). Lee County, Auburn, July, August, 1898 (*Earle*).

Family NECTRIACEAE.

NECTRIA Fr.

Nectria episphaeria (Tode) Fr.
Ala. Bull. 185. Cornell Bull. 10.
On *Diatrype stigma*. Lee County, Auburn, February 22, 1891 (*Atkinson*); Lee County, March, 1896 (*Underwood & Earle*).
On *Eutypella* sp. Lee County, February, March, 1896 (*Underwood & Earle*).

Nectria meliae Earle, Bull. Torr. Club, **25**:364. 1898.
On *Melia azedarach*. Lee County, March, 1896 (*Underwood & Earle*).

Nectria rubicarpa Cooke.
Ala. Bull. 186.
On *Gelsemium sempervirens* (?). Lee County, February, 1896 (*Underwood & Earle*).
New Jersey.

Nectria saccharina B. & C.
Peters coll. **1**:165. Ala. Bull. 186.

Nectria viticola B. & C.
Grevillea, **4**:45. Ala. Bull. 186.
On branches of Vitis (*Peters*).

GIBBERELLA Sacc.

Gibberella pulicaris (Fr.) Sacc.
Ala. Bull. 184.
On living roots of *Gossypium herbaceum*, the cotton plant. Lee County, November, 1889 (*Atkinson*).

SPHAEROSTILBE Tul.

Sphaerostilbe coccophila Tul.
On *Aspidiotus obscurus* on oak bark. Lee County, January, 1897 (*Earle*).

Sphaerostilbe gracilipes Tul.
Grevillea, **4**:46. Ala. Bull. 186.
On Platanus (*Peters*).

ELEUTHEROMYCES Fkl.

Eleutheromyces subulatus (Tode) Fkl.
Cornell Bull. 10.
On decaying agarics. Lee County, Auburn (*Atkinson*).

Family HYPOCREACEAE.

HYPOCREA Fr.

Hypocrea apiculata C. & P.
Ala. Bull. 184.
Lee County (*Atkinson*).

Hypocrea chromosperma C. & P.
Peters coll. 3, No. 23, labeled *Daedalea sepium* Berk. (?).
A reexamination of the Peters specimen shows it to be the above species.

Hypocrea citrina (Pers.) Fr.
Ala. Bull. 184.
On *Exidia glandulosa*. Lee County, July, 1896 (*Underwood & Earle*).
Louisiana, South Carolina. Europe.

Hypocrea contorta (Schw.) B. & C.
Peters coll. **3**:68. Ala. Bull. 185.

Hypocrea petersii B. & C.
Grevillea, **4**:13. Ala. Bull. 184.
(*Peters.*)

Hypocrea polyporoidea B. & C.
Grevillea, **4**:15. Peters coll. **1**:152. Ala. Bull. 184.
On Fagus (*Peters*).

Family CLAVICIPITACEAE.

CORDYCEPS Fr.

Cordyceps capitata Fr.
Grevillea, **4**:13. Ala. Bull. 183.
(*Peters.*)
Europe.

Cordyceps ophioglossoides (Ehrh.) Link.
Peters coll. **1**:54. Ala. Bull. 183.
Winston County, June, 1896 (*Underwood*).

CLAVICEPS Tul.

Claviceps sp. (Sclerotium stage only).
Ala. Bull. 183.
On *Chrysopogon avenaceus*. Macon County, August, 1896 (*Carver*).
On Erianthus. Macon County, August, 1896 (*Carver*).

ECHINODOTHIS Atkinson.

Echinodothis tuberiformis (B. & Rav.) Atkinson, Bull. Torr. Club, **21**:224. 1894.
Ala. Bull. 184. Cornell Bull. 10.
On *Arundinaria tecta*. Lee County, Auburn, August, October, 1891 (*Atkinson*).
South Carolina.

Order DOTHIDEALES.

Family DOTHIDEACEAE.

DOTHIDELLA Speg.

Dothidella scutula (B. & C.) Sacc.
On Persea. Escambia County, Flomaton (*S. M. Tracy*).

MONTAGNIELLA Speg.

Montagniella heliopsidis (Schw.) Sacc.
Cornell Bull. 8.
On leaves of *Heliopsis* sp. Lee County, Auburn, summer and autumn (*Atkinson*).

MYRIOGENOSPORA Atkinson.

Myriogenospora paspali Atkinson, Bull. Torr. Club, **21**: 225. 1894.
Cornell Bull. 11.
On leaves of *Paspalum laeve*. Lee County, Auburn, 1894 (*Atkinson*).

OPHIODOTHIS Sacc.

Ophiodothis atramentosa (B. & C.) Earle, Bull. Torr. Club, **27**: 121. 1900.
Ala. Bull. 183. Cornell Bull. 10. In both as *Dothichloe hypoxylon* (Peck) Atkinson.
On *Andropogon virginicus*. August 30, 1891 (*Atkinson*).
On *Eragrostis tenuis*. Lee County, Auburn, September, 1891 (*Atkinson*).
On *Eragrostis campestris*. September, 1891 (*Atkinson*).

Ophiodothis atramentosa aristidae (Atkinson) Earle, Bull. Torr. Club, **27**: 122. 1900.
Ala. Bull. 183. Cornell Bull. 11. In both as *Dothichloe aristidae* Atkinson.
On stems of *Aristida purpurascens*. Lee County, Auburn, September 12, October 3, 1891 (*Duggar & Atkinson*).

PHYLLACHORA Nitsch.

Phyllachora ambrosiae (B. & C.) Sacc.
Grevillea, **4**: 105, under Dothidea. Cornell Bull. 11. Ala. Bull. 195.
On *Ambrosia artemisiaefolia* (*Beaumont*). Lee County, Auburn, 1890 (*Atkinson*); Lee County, 1891 (*Duggar*).
On *Ambrosia trifida*. 1891 (*Duggar*).

Phyllachora beaumontii (B. & C.) Cooke.
Peters coll. **1**: 194. Ala. Bull. 195.
On *Prunus caroliniana*. Macon County (*Beaumont*).

Phyllachora cynodontis Niess.
Cornell Bull. 11.
On *Sporobolus indicus*. Lee County, Auburn, July 25, 1890 (*Atkinson*).
On leaves of *Andropogon* sp. Macon County, Shorter (*Atkinson*).
Europe.

Phyllachora cornuospora Atkinson.
Cornell Bull. 11.
On leaves of *Panicum elongatum*. Lee County, Auburn, August 27, 1891 (*Atkinson*).

Phyllachora graminis (Pers.) Fkl.
Ala. Bull. 195. Cornell Bull. 11.
On *Andropogon virginicus*. Lee County, 1891 (*Duggar*).
On *Paspalum laeve*. Lee County, 1891 (*Duggar*).
On *Paspalum setaceum*. Lee County, Auburn, 1891 (*Newman*).
On *Panicum dichotomum* and *P. latifolium*. Lee County, 1891 (*Duggar*).
On *Panicum* sp. Lee County, 1891 (*Duggar*); Macon County, March, 1896 (*Carver*).
On *Panicum elongatum*. Auburn, 1891 (*Duggar*).
On *Sorghum halepense*. Lee County, Auburn, 1891 (*Duggar*).
On *Muhlenbergia diffusa*. Lee County, Auburn, 1891 (*Duggar*).
On *Eragrostis tenuis*. Lee County, Auburn, 1891 (*Duggar*).
South Carolina, New Jersey, Ohio. Europe.

Phyllachora lespedezae (Schw.) Cooke.
Ala. Bull. 196. Cornell Bull. 12.
On *Lespedeza* sp. Lee County, Auburn, October 21, 1890 (*Atkinson*).

Phyllachora ulmi (Duv.) Fkl.
Ala. Bull. 196.
On *Ulmus* sp. Macon County, August, 1896 (*Carver*).
New Jersey. Europe.

PLOWRIGHTIA Sacc.

Plowrightia morbosa (Schw.) Sacc.
Ala. Bull. 193. Cornell Bull. 9.
On *Prunus angustifolia*. Lee County, November, 1895 (*Underwood & Earle*).
On *Prunus americana*. Montgomery County, Pikeroad, 1891 (*Atkinson*).
On *Prunus serotina*. Lee County, February, 1896 (*Underwood & Earle*).
On *Prunus triflora*. Mobile County, January, 1896 (*Earle*).
On branches of *Prunus umbellata*. Lee County, Auburn, 1891 (*Newman*).
New Jersey.

SCIRRHIA Nitsch.

Scirrhia groveana Sacc.
Ala. Bull. 196.
On *Typha latifolia*. Lee County, March, 1896 (*Underwood & Earle*).

Scirrhia sporoboli Atkinson.
Cornell Bull. 9.
On stems of *Sporobolus asper*. Lee County, Auburn (*Duggar & Newman*).

Order SPHAERIALES.

Family CHAETOMIACEAE.

CHAETOMIUM Kunze.

Chaetomium olivaceum C. & E.
Cornell Bull. 6.
On dead stems of *Gossypium herbaceum*. Lee County, Auburn, October 7, 1891 (*Atkinson*).

Chaetomium pusillum E. & E.
Cornell Bull. 6,
On old paper, covering a culture vessel in laboratory. Lee County, Auburn (*Atkinson*).

Family SPHAERIACEAE.

CHAETOSPHAERIA Fkl.

Chaetosphaeria brevispinosa Atkinson.
Cornell Bull. 6.
On leaf-sheaths of *Arundinaria tecta*. Lee County, Auburn (*Atkinson*).

Chaetosphaeria pannicola (B. & C.) Sacc.
Ala. Bull. 187.
On *Vitis rotundifolia*. Lee County, February, 1896 (*Underwood & Earle*).
On a cultivated species of Vitis. Lee County, January, 1896 (*Underwood & Earle*).

HERPOTRICHIA Fkl.

Herpotrichia rhodomphala (Berk.) Sacc.
Peters coll. **3**: 44. Ala. Bull. 189.
On dead wood (*Beaumont*).

LASIOSPHAERIA Ces. & De Not.

Lasiosphaeria pezizula (B. & C.) Sacc.
Ala. Bull. 191.
On dead wood. Lee County, January, February, 1896 (*Underwood & Earle*).

Lasiosphaeria rhacodium (Pers.) De Not.
Ala. Bull. 191.
On rotten wood. Lee County, February, 1896 (*Underwood & Earle*).
Europe.

ROSELLINIA Ces. & De Not.

Rosellinia aquila (Fr.) De Not.
Ala. Bull. 193. Cornell Bull. 9.
On dead branches of deciduous trees. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On *Liriodendron*. Lee County, January, February, 1896 (*Underwood & Earle*).
Nebraska. Europe.

Rosellinia pulveracea (Ehrh.) Fkl.
Ala. Bull. 193.
On *Vitis rotundifolia*. Lee County, February, 1896 (*Underwood & Earle*).

Rosellinia subiculata (Schw.) Sacc.
Ala. Bull. 193.
On rotten wood. Lee County, February, 1896 (*Underwood & Earle*).

TRICHOSPHAERIA Fkl.

Trichosphaeria underwoodii Earle, Bull. Torr. Club, **25**:363. 1898.
On *Arundinaria* sp. Auburn, January, 1896 (*Underwood & Earle*).

Family CERATOSTOMATACEAE.

CERATOSTOMA Fr.

Ceratostoma piliferum Fr. (Fkl.)
Grevillea, **4**:146, under Sphaeria. Ala. Bull. 187.
On Quercus (*Peters*).
Europe.

LENTOMITA Niess.

Lentomita longirostrata Atkinson.
Cornell Bull. 7.
On stems of *Ambrosia artemisiaefolia*. Lee County, Auburn, October 1, 1891 (*Duggar*).

Family CUCURBITARIACEAE.

FRACCHIAEA Sacc.

Fracchiaea calista (B. & C.) Sacc.
Rav. Fung. Car. Exsic. **5**:67. Ala. Bull. 189.
On Carpinus (*Peters*).

Family AMPHISPHAERIACEAE.

CARYOSPORA De Not.

Caryospora putaminum (Schw.) De Not.
Ala. Bull. 186.
On peach pits. Mobile County, December, 1895; Lee County, February, 1896 (*Underwood & Earle*).
New Jersey. South Europe.

OHLERIA Fkl.

Ohleria rugulosa Fkl.
Ala. Bull. 192.
On dead wood. Lee County, February, 1896 (*Underwood & Earle*).
New Jersey. Europe.

Family LOPHIOSTOMATACEAE.

LOPHIOSTOMA Fr.

Lophiostoma niessleanum Sacc.

Cornell Bull. 7.

On dead stems of *Ambrosia artemisiaefolia*. Lee County, Auburn, October 1, 1891 (*Duggar*).

Family MYCOSPHAERELLACEAE.

GUIGNARDIA Viala & Ravaz.

Guignardia bidwellii (Ellis) Viala & Ravaz.

Ala. Bull. 191, under Laestadia. Cornell Bull. 6, under Carlia.

On *Parthenocissus* (*Ampelopsis*) *quinquefolia*. Lee County, Auburn, May 13, 1890 (*Atkinson*).

On *Vitis rotundifolia*. Lee County, 1890 (*Atkinson*).

On *Vitis vinifera*. Lee County, 1891 (*Atkinson*).

On a cultivated species of Vitis. Lee County, 1891 (*Atkinson*).

MYCOSPHAERELLA Johanson.

Mycosphaerella arundinariae (Atkinson).

Cornell Bull. 9, under Sphaerella.

On leaves of *Arundinaria tecta*. Lee County, Auburn (*Atkinson*).

Mycosphaerella baptisiicola (Cooke).

Cornell Bull. 9, under Sphaerella.

On leaves of Elymus. Lee County, Auburn, July 5, 1890 (*Atkinson*).

Mycosphaerella leptopleura (De Not.).

Ala. Bull. 193. Cornell Bull. 9, under Sphaerella.

On rotting leaves of *Secale cereale*. Lee County, Auburn (*Atkinson*).

Mycosphaerella gossypina (Atkinson).

Ala. Bull. 193. Cornell Bull. 9, under Sphaerella.

On leaves of *Gossypium herbaceum*. Lee County, Alberta, 1890 (*Cathcart*); Lee County, Auburn, 1890 (*Atkinson*).

Mycosphaerella fragariae (Tul.) Lind.

Ala. Bull. 193, under Sphaerella. Cornell Bull. 39, as *Ramularia tulasnei* Sacc.

On *Fragaria vesca*, in cultivation. Lee County, Auburn, October, 1890 (*Atkinson*); Mobile County, December, 1895 (*Earle*).

Mycosphaerella colorata (Peck).

Rav. Fung. Car. Exsic. **3**:71, as *Depazea kalmicola* Schw. Ala. Bull. 193. Cornell Bull. 9.

On *Kalmia latifolia* (*Peters*).

On leaves of Kalmia. Lee County, Auburn, 1891 (*Atkinson*).

Family PLEOSPORACEAE.

APIOSPORA Sacc.

Apiospora apiospora (Dur. & Mont.) Underwood & Earle.

Grevillea, **4**:144, under *Sphaeria*. Ala. Bull. 186.

On Arundinaria (*Peters*).

DIDYMOSPHAERIA Fkl.

Didymosphaeria polysticta (B. & C.) Sacc.

Grevillea, **4**:149, under Sphaeria. Ala. Bull. 188.

On Smilax (*Beaumont*).

HEPTAMERIA Rehm. & Thuem.

Heptameria mesoedema (B. & C.) Sacc.

Cornell Bull. 6.

On stems of Eupatorium. Lee County, Auburn, September 17, 1891 (*Duggar*).

LEPTOSPHAERIA Ces. & De Not.

Leptosphaeria beaumontii (B. &. C.) Sacc.
Grevillea, **4**: 145, under Sphaeria. Ala. Bull. 191.
On stalks of grass (*Beaumont*).

Leptosphaeria elymi Atkinson.
Cornell Bull. 7.
On leaves of Elymus. Lee County, Auburn, July 5, 1890 (*Atkinson*).

Leptosphaeria eumorpha (B. & C.) Earle, Bull. Torr. Club, **25**: 361. 1898.
Grevillea, **4**: 145, under Sphaeria. Cornell Bull. 6, as *Didymosphaeria eumorpha* (B. & C.) Atkinson.
On stems of *Arundinaria tecta*. Lee County, Auburn, September 19, 1891 (*Duggar*).

Leptosphaeria michotii (West) Sacc.
Cornell Bull. 7.
On Elymus. Lee County, Auburn, July 5, 1890 (*Atkinson*).
Europe.

Leptosphaeria orthogramma (B. & C.) Sacc.
Ala. Bull. 191.
On *Erianthus* sp. Macon County, April, 1896.
Pennsylvania.

Leptosphaeria planiuscula (Riess) Ces. & De Not.
Cornell Bull. 7.
On dead stems, probably of Compositae. Lee County, Auburn, May 15, 1891 (*Atkinson*).
Europe.

Leptosphaeria pomona Sacc.
Cornell Bull. 7.
On *Malus malus*. Lee County, Gold Hill, September, 1890 (*Atkinson*).

METASPHAERIA Sacc.

Metasphaeria ambrosiaecola Atkinson.
Cornell Bull. 8.
On dead stems of *Ambrosia artemisiaefolia*. Lee County, Auburn, October 1, 1891 (*Duggar*).

Metasphaeria graminum Sacc.
Cornell Bull. 8.
On dead leaves of *Chrysopogon avenaceus*. Lee County, Auburn, September 12, 1891 (*Duggar*).
Europe.

Metasphaeria infuscans E. & E.
Ala. Bull. 191. Cornell Bull. 8.
On dead stems of *Andropogon virginicus*. Lee County, Auburn, September 12, 1891 (*Duggar*).

Metasphaeria nigro-maculans Earle, Bull. Torr. Club, **25**: 362. 1898.
On *Agave virginica*. Lee County, Auburn, July 8, 1896 (*Underwood & Earle*).

OPHIOBOLUS Riess.

Ophiobolus acuminatus (Sowb.) Duby.
Grevillea, **4**: 150, under Sphaeria. Ala. Bull. 192.
(*Peters.*)
Europe.

Ophiobolus anguillides (Cooke) Sacc.
Ala. Bull. 192. Cornell Bull. 8.
On dead stems of *Ambrosia artemisiaefolia*. Lee County, Auburn, May, 1892 (*Atkinson*).

Ophiobolus glomus (B. & C.) Sacc.
Grevillea, **4**: 152, under *Sphaeria*. Ala. Bull. 192. Cornell Bull. 8.
On Ambrosia (*Beaumont*).
On stems of *Ambrosia artemisiaefolia*. Lee County, Auburn, May, 1892 (*Atkinson*).

Ophiobolus porphyrogonus (Tode) Sacc.
Cornell Bull. 8.
On the cut end of a stem of *Gossypium herbaceum*. Lee County, Auburn, October 10, 1891 (*Atkinson*).
New Jersey.

PHYSALOSPORA Niessl.

Physalospora carpogena Atkinson.
Cornell Bull. 8.
On seeds of *Rubus argutus* (*R. villosus*). Lee County, December 3, 1891 (*Duggar*).

Physalospora disrupta (B. & C.) Sacc.
Ala. Bull. 192.
On *Smilax* sp. Lee County, March, 1896 (*Underwood & Earle*)

Physalospora ilicis (Schlich.) Sacc.
Cornell Bull. 8.
On *Ilex opaca*. Lee County, Autumn, 1891 (*Atkinson*).

Physalospora philoprina (B. & C.) Sacc.
Bull. Torr. Club, **25**:362.
On *Ilex opaca*. Lee County, Auburn, March, 1897 (*Earle & Baker*).

Physalospora phlyctanoides (B. & C.) Sacc.
Grevillea, **4**:151, under *Sphaeria*. Ala. Bull. 192.
On stems of Dolichos (*Beaumont*).

PLEOSPORA Rabenh.

Pleospora herbarum (Pers.) Rabenh.
Grevillea, **4**:150, under *Sphaeria*. Ala. Bull. 193.
(*Beaumont.*)

Pleospora americana E. & E.
Cornell Bull. 9.
On leaves of *Vigna catjang*. Lee County, Auburn, June 30, 1890 (*Atkinson*).
On stems of *Viola tricolor*. Lee County, February 23, 1891 (*Atkinson*).

Pleospora nigricantia Atkinson.
Cornell Bull. 9.
On fallen leaves of *Gossypium herbaceum* (*Atkinson*).

UROSPORELLA Atkinson.

Urosporella americana Atkinson.
Cornell Bull. 10.
On dead stems of an herb. Lee County, Auburn, July, 1890 (*Atkinson*).

Family MASSARIACEAE.

MASSARINA Sacc.

Massarina chrysopogonis Atkinson.
Cornell Bull. 7.
On dead stems of *Chrysopogon avenaceus*. Lee County, Auburn, November 1, 1891 (*Atkinson*).

MASSARIA De Not.

Massaria epileuca B. & C.
Grevillea, **4**:156. Ala. Bull. 191.
On *Morus rubra*. Lee County, January, 1896 (*Underwood & Earle*).

Family GNOMONIACEAE.

GNOMONIA Ces. & De Not.

Gnomonia sabalicola Earle, Bull. Torr. Club, **25**:361. 1898.
On dead petioles of *Sabal adansonii*. Lee County, Auburn, April 25, July 9, 1896 (*Underwood & Earle*).

Family CLYPEOSPHAERIACEAE.

ANTHOSTOMELLA Sacc.

Anthostomella eliminata (B. & C.) Sacc.
Grevillea, **4**:148, under *Sphaeria*. Ala. Bull. 186.
On Smilax (*Peters*).

Anthostomella sphaerotheca Earle, Bull. Torr. Club, **25**:360. 1898.
On dead petioles of *Sabal adansonii*. Macon County, Tuskegee, January 20, 1897 (*Carver*).

CLYPEOSPHAERIA Fkl.

Clypeosphaeria sabaligera (B. & C.) Sacc.
Grevillea, **4**:147. Ala. Bull. 187.
On *Sabal* sp. (*Beaumont*).

TRABUTIA Sacc. & Roum.

Trabutia quercina Fr.
Ala. Bull. 194.
On *Quercus nigra* (*Q. aquatica*). Lee County, April, 1896 (*Underwood & Earle*).
Louisiana.

Family VALSACEAE.

ANTHOSTOMA Nitsch.

Anthostoma atropunctata (Schw.) Sacc.
Ala. Bull. 186.
On *Quercus* sp. Lee County, November, 1895 (*Underwood*).

DIAPORTHE Nitschke.

Diaporthe dichaenoides (B. & C.) Sacc.
Grevillea, **4**:98, as Melogramma. Ala. Bull. 187.
On Quercus (*Beaumont*).

VALSA Fr.

Valsa (Eutypa) spinosa (Pers.) Tul.
Ala. Bull. 188.
On Quercus. Lee County, February, April, 1896 (*Underwood & Earle*).
Europe.

Valsa (Eutypella) cerviculata Fr.
Ala. Bull. 188.
On *Alnus rugosa*. Lee County, February, April, 1896 (*Underwood & Earle*).
Europe.

Valsa (Eutypella) heteracantha Ellis.
Ala. Bull. 188, as *Eutypella glandulosa* (Cooke) E. & E.
On *Melia azedarach*. Lee County, March, 1896 (*Underwood & Earle*).
Louisiana.
Ellis, who has since examined the specimens, determined them as above.

Valsa (Eutypella) platani (Schw.) Cooke.
Rav. Fung. Car. Exsic. **5**: 62. Ala. Bull. 188.
On *Platanus* (*Peters*).
Louisiana, New Jersey.

Valsa (Eutypella) stellulata Fr.
Ala. Bull. 189.
On *Melia azedarach*. Lee County, March, 1896 (*Underwood & Earle*).
On *Smilax* sp. Lee County, February, 1896 (*Underwood & Earle*).
Texas, Louisiana, South Carolina, Pennsylvania, New Jersey. Europe.

Valsa (Euvalsa) americana B. & C.
Peters coll. **3**: 67. Ala. Bull. 194.

Valsa (Euvalsa) munda B. & C.
Grevillea, **4**: 100. Ala. Bull. 194.
On smooth yellow branches of Cornus (*Peters*).

Family MELANCONIDACEAE.

MELANCONIS Tul.

Melanconis hicoriae Atkinson.
Cornell Bull. 7.
On branches of *Hicoria orata*. Lee County, Auburn, January, 1891 (*Atkinson*).

VALSARIA De Not.

Valsaria exasperans (Ger.) E. & E.
Ala. Bull. 194.
On bark. Lee County, February, 1896 (*Underwood & Earle*).

Valsaria nudicollis (B. & C.) Sacc.
Grevillea, **4**: 93, under Hypoxylon. Bull. Torr. Club, **25**: 363.
On pine wood. Lee County, January, 1896 (*Underwood*).
South Carolina.

Family DIATRYPACEAE.

DIATRYPE Fr.

Diatrype disciformis (Hoffm.) Fr.
Grevillea, **4**: 95. Ala. Bull. 187.
(*Peters.*)
South Carolina, Pennsylvania, Ohio.. Europe.

Diatrype platystoma (Schw.) Berk.
Rav. Fung. Car. Exsic. **5**: 55, under Hypoxylon. Ala. Bull. 187.
On Ostrya (*Peters*).
South Carolina, Pennsylvania, Ohio, New Jersey.

Diatrype stigma (Hoffm.) De Not.
Ala. Bull. 187. Cornell Bull. 6.
On dead oak limb. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On dead limbs. Winston County, June, 1896 (*Underwood*).
South Carolina, New Jersey. Europe.

Diatrype tremellophora Ellis.
Ala. Bull. 187.
On *Magnolia virginiana* (*M glauca*). Lee County, January, March, 1896 (*Underwood & Earle*).
New Jersey.

Diatrype virescens (Schw.) Ellis.
Grevillea, **4**: 95, as *Diatrype disciformis virescens*. Ala. Bull. 188.
On Fagus (*Peters*).
Georgia to New England.

DIATRYPELLA Ces. & De Not.

Diatrypella cephalanthi (Schw.) Sacc.
Grevillea, **4**:96, under Diatrype. Ala. Bull. 188.
On *Cephalanthus occidentalis* (*Beaumont*).
New Jersey.

Diatrypella nigro-annulata (Grev.) E. & E.
Ala. Bull. 188.
On dead twigs. Lee County, June, 1896 (*Underwood & Earle*).

Diatrypella discoidea alni Cooke.
Ala. Bull. 188.
On *Alnus rugosa*. Lee County, January, May, 1896 (*Underwood & Earle*).

Diatrypella quercina (Pers.) Nitsch.
Grevillea, **4**:95, under Diatrype. Ala. Bull. 188.
On dead oak (*Peters*).
South Carolina, New Jersey. Europe.

Diatrypella vernicae Ellis.
Ala. Bull. 188, as *D. quercina*.
On dead twigs. Lee County, Auburn, February, 1896 (*Underwood & Earle*), (teste Ellis).

Diatrypella prominens (Hedw.) E. & E.
On Platanus. Macon County, Tuskegee (*Carver*).

Family MELOGRAMMATACEAE.

ENDOTHYA Fr.

Endothia gyrosa (Schw.) Fkl.
Ala. Bull. 188.
On Liquidambar. Lee County, March, 1896 (*Underwood & Earle*).
On Quercus. Lee County, February, 1896 (*Underwood & Earle*).
South Carolina.

MELOGRAMMA Fr.

Melogramma meliae Curt.
Ala. Bull. 191.
On *Melia azedarach*. Lee County, March, 1896 (*Underwood & Earle*).
South Carolina.

Family XYLARIACEAE.

NUMMULARIA Tul.

Nummularia clypeus (Schw.) Fkl.
Ala. Bull. 192.
On *Magnolia acuminata*. Lee County, December, 1895 (*Underwood*).
On *Alnus rugosa*. Lee County, November, December, 1895 (*Underwood*).
On *Quercus* sp. Lee County, December, 1895 (*Underwood*); Macon County, August, 1896 (*Carver*).
On *Vitis* sp. Lee County, January, 1896 (*Underwood & Earle*).
South Carolina.

Nummularia discreta (Schw.) Tul.
Grevillea, **4**:94, under Hypoxylon. Ala. Bull. 192.
On Cercis (*Peters*).
New Jersey, Ohio. Europe.

Nummularia nummularia (Bull.) Atkinson.
Cornell Bull. 8.
On dead branches and trunks of deciduous trees. Lee County, Auburn, 1890 (*Atkinson*).
New Jersey, Ohio, South Carolina. Europe.

Nummularia punctulata (B. & Rav.) Sacc.
Ala. Bull. 192.
On *Alnus rugosa*. Lee County, March, 1896 (*Underwood & Earle*).
On *Quercus* sp. Lee County, March, 1896 (*Underwood & Earle*).
South Carolina.

Nummularia repanda (Fr.) Nitsch.
Peters coll. No. 66, under Sphaeria. Ala. Bull. 192.
On Cercis (*Peters*).
Europe.

HYPOXYLON Bull.

Hypoxylon annulatum (Schw.) Mont.
Ala. Bull. 189. Cornell Bull. 7.
On dead oak limb. Hale County, Gallion, August, 1890 (*Duggar*).
On *Acer rubrum*. Lee County, February, 1896 (*Underwood & Earle*).
On *Magnolia virginiana*. Lee County, March, 1896 (*Underwood & Earle*).
On *Quercus* sp. Lee County, February, March, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

Hypoxylon atramentosum (Fr.) Underwood & Earle.
Ala. Bull. 189.
On dead wood. Lee County, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*).

Hypoxylon beaumontii B. & C.
Ala. Bull. 189.
Conecuh County (*Beaumont*).

Hypoxylon callostroma (Schw.) B. & C.
Grevillea, **4**:51. Ala. Bull. 189.
On *Ilex verticillata* (*Beaumont*).
Pennsylvania.

Hypoxylon caries (Schw.) Sacc.
Ala. Bull. 189.
On Acer. Lee County, February, 1896 (*Underwood & Earle*).
On dead wood. Lee County, March, 1896 (*Underwood & Earle*).

Hypoxylon coccineum Bull.
Ala. Bull. 189.
On *Alnus rugosa*. Lee County, March, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, Ohio. Europe.

Hypoxylon crocatum Mont.
On *Magnolia acuminata*. Lee County, winter, 1896 (*Earle*).

Hypoxylon crocopeplum B. & C.
Ala. Bull. 189.
On decayed bark. Lee County, December, 1895 (*Underwood*).
South Carolina.

Hypoxylon decorticatum (Schw.) Berk.
Ala. Bull. 190.
On bark. Lee County, February, 1896 (*Underwood & Earle*).
South Carolina.

Hypoxylon fuscum (Pers.) Fr.
Ala. Bull. 190. Cornell Bull. 7.
On dead oak limb. Lee County, Auburn, autumn, 1889 (*Atkinson*).
On Quercus. Hale County, Gallion (*Duggar*).
On *Alnus rugosa*. Lee County, December, 1895 (*Underwood*).
On *Ostrya virginiana*. Lee County, February, 1896 (*Underwood & Earle*).
Europe.

Hypoxylon howeianum Peck.
Ala. Bull. 190.
Lee County, February, 1896 (*Underwood & Earle*)
New Jersey, Ohio.

Hypoxylon insidens (Schw.) Berk.
Ala. Bull. 190.
On *Liriodendron tulipifera*. Lee County, February, 1896 (*Underwood & Earle*).
Texas.

Hypoxylon luridum Nitsch.
Ala. Bull. 190.
On Carpinus. Lee County, 1896 (*Earle*).
Europe.

Hypoxylon marginatum (Schw.) Berk.
Grevillea, **4**:49. Ala. Bull. 190.
On *Acer rubrum*. Lee County, March, 1896 (*Underwood & Earle*).
On *Quercus nigra* (*Q. aquatica*). Lee County, March, 1896 (*Underwood & Earle*).
On Quercus (*Beaumont*).
Ohio, New Jersey.

Hypoxylon perforatum (Schw.) Fr.
Ala. Bull. 190. Cornell Bull. 6.
On canes of *Arundinaria tecta* Lee County, Auburn, August 23, 1891 (*Duggar*).
On Liquidambar. Lee County, January, 1896 (*Underwood & Earle*).
On Quercus. Lee County, January, 1896 (*Underwood & Earle*).
On Smilax. Lee County, January, 1896 (*Underwood & Earle*).
On Vitis. Lee County, January, 1896 (*Underwood & Earle*).

Hypoxylon petersii B. & C.
Peters coll. **1**:158. Journ. Linn. Soc. **10**:384. Ala. Bull. 190.
On *Quercus alba*. Winston County (*Peters*).
Ohio. Cuba.

Hypoxylon investiens Schw.
Rav. Fung. Car. Exsic. **4**:33. Ala. Bull. 190.
On Liriodendron (*Beaumont*).
On dead wood. Lee County, March, April, 1896 (*Underwood & Earle*).
Texas.

Hypoxylon purpureum Nitsch.
Cornell Bull. 7.
On dead branches. Hale County, Gallion, August 14, 1894 (*Duggar*).
Europe.

Hypoxylon rubiginosum (Pers.) Fr.
Ala. Bull. 190.
On dead wood. Lee County, February, March, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, Ohio. Europe.

Hypoxylon rutilum Tul.
Ala. Bull. 191.
On bark of Quercus. Winston County, June, 1896 (*Underwood*).
Europe.

Hypoxylon serpens Pers.
Grevillea, **4**:93. Ala. Bull. 191.
(*Beaumont.*)
South Carolina, New Jersey.

Hypoxylon subchlorinum Ell. & Calk.
Ala. Bull. 191.
On *Alnus rugosa*. Lee County, February, 1896 (*Underwood & Earle*).
On *Carpinus caroliniana*. Lee County, February, 1896 (*Underwood & Earle*).
On *Viburnum* sp. Lee County, January, 1896 (*Underwood & Earle*).

Hypoxylon xanthoceras B. & C.
Ala. Bull. 191.
On *Alnus rugosa*. Lee County, February, 1896 (*Underwood & Earle*).
New England.

USTULINA Tul.

Ustulina vulgaris Tul.
Ala. Bull. 194.
On old stumps. Lee County, February, March, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

DALDINIA De Not.

Daldinia concentrica (Schw.) Ces. & De Not.

Ala. Bull. 187. Cornell Bull. 6.

On *Magnolia acuminata*. Lee County, November, 1895 (*Underwood*); Winston County, June, 1896 (*Underwood*).

On dead trunks of deciduous trees. Lee County, Prague Junction, July, 1890 (*Atkinson*).

Daldinia vernicosa (Schw.) Ces. & De Not.

Ala. Bull. 187.

On *Magnolia virginiana* (*M. glauca*). Lee County, December, 1896 (*Earle*).

New Jersey.

XYLARIA Hill.

Xylaria hypoxylon (L.) Grev.

Ala. Bull. 195. Cornell Bull. 10.

On *Acer rubrum*. Lee County, February, 1895.

On old stump. Lee County, Auburn, March, 1891 (*Atkinson*).

Louisiana, New Jersey, Ohio. Europe.

Xylaria polymorpha (Pers.) Grev.

Ala. Bull. 195. Cornell Bull. 10.

On dead trunk of Magnolia. Macon County, Shorter, July 16, 1890.

Conidial stage: Lee County, April, 1896 (*Underwood & Earle*).

Ascomycetous stage: Hale County, May, 1896 (*Underwood*).

Europe.

Xylaria corniformis Fr.

Ala. Bull. 194.

On Salix. Lee County, February, 1896 (*Underwood & Earle*).

The conidial state (*Isaria flabelliformis*): Lee County, May, 1896 (*Underwood & Earle*).

South Carolina. Europe.

Xylaria fulvella B. &. C.

Journ. Linn. Soc. **10**: 380. Ala. Bull. 194.

On Salix. Lee County, February, 1896 (*Underwood & Earle*).

Cuba.

PORONIA Willd.

Poronia oedipus Mont.

Rav. Fung. Car. Exsic. **3**: 46. Ala. Bull. 193.

On horse dung (*Peters*).

Texas, New Jersey. Europe.

SPHAERIA Hall.[1]

Sphaeria concentrica (B. & C.) Bolt.

Grevillea, **4**: 155, under Depazea. Ala. Bull. 194.

On leaves of *Asarum virginicum*.

Sphaeria palmarum Mont.

Grevillea, **4**: 147. Ala. Bull. 194.

On Sabal (*Beaumont*).

---

[1] The precise relations of the two following Sphaeriales are doubtful. (Earle.)

Class BASIDIOMYCETES.

Order USTILAGINALES.

Family USTILAGINACEAE.

USTILAGO Pers.

Ustilago avenae (Pers.) Jensen.

Ala. Bull. 207. Cornell Bull. 16.
In inflorescence of *Arena sativa*. Lee County, Auburn, May, 1891 (*Atkinson*).
On *Arena sativa*. Lee County, May, 1896 (*Underwood & Earle*).
Ohio.

Ustilago axicola Berk.

Grevillea, **3**:59. Ala. Bull. 207, under *Cintractia*.
On Cyperus (*Beaumont*).
On *Fimbristylis autumnalis*. Lee County, September, 1896 (*Earle*).

Ustilago euchlaenae Arcang.

Ala. Bull. 207.
On *Euchlaena luxurians*. Lee County, October, 1895 (*Underwood*).

Ustilago rabenhorstiana Kuehn.

Ala. Bull. 207. Cornell Bull. 16, as *U. cesatii* Fischer.
On *Syntherisma sanguinale*. Lee County, Auburn, autumn, 1889 (*Atkinson*).
Mississippi, Ohio. Europe.

Ustilago sorghi (Link) Pass.

Ala. Bull. 208.
On *Sorghum* sp. Lee County, November, 1895 (*Underwood*).
Nebraska. Europe.

Ustilago sparsa Underwood.

Bull. Torr. Club, **24**: 86. 1897. Ala. Bull. 208.
On scattered ovaries of *Dactyloctenium aegyptium*. Lee County, November, 1895 (*Underwood*); October, 1896 (*Earle*).

Ustilago tritici (Pers.) Jensen.

Ala. Bull. 208. Cornell Bull. 16.
On *Triticum vulgare*. Lee County, Auburn, May, 1891 (*Atkinson*).
Ohio.

Ustilago utriculosa (Nees) Tul.

Ala. Bull. 208. Cornell Bull. 16.
On *Polygonum hydropiper*. Prague, June, 1890 (*Atkinson*).
In ovaries of *Polygonum pennsylvanicum*. Lee County, Auburn, October 18, 1891 (*Duggar*).
Ohio, New Jersey. Europe.

Ustilago zeae (Berkm.) Magn.

Ala. Bull. 208. Cornell Bull. 16.
In the inflorescence, canes, and leaves of *Zea mays*. Lee County, Auburn, 1891 (*Duggar & Atkinson*).
Nebraska. Europe.

SOROSPORIUM Rudolphi.

Sorosporium syntherismae (Schw.) Farlow.

Ala. Bull. 207. Cornell Bull. 16, as *S. everhartii* E. & Gr.
On *Andropogon glomeratus*. Lee County, 1891 (*Atkinson*).
On *Andropogon scoparius*. Lee County, 1891 (*Atkinson*).
In inflorescence of *Andropogon virginicus*. Lee County, Auburn, 1891 (*Atkinson*).

TOLYPOSPORELLA Atkinson.

Tolyposporella chrysopogonis Atkinson.

Cornell Bull. 16.
On culms of *Chrysopogon arenaceus*. Lee County, Auburn, autumn, 1891 (*Duggar*); March, 1892 (*Atkinson*).

Family TILLETIACEAE.

ENTYLOMA De Bary.

Entyloma compositarum Farlow.
Ala. Bull. 207.
On *Gnaphalium* sp. Lee County, April, 1896 (*Underwood & Earle*).

Entyloma saniculae Peck.
Ala. Bull. 207. Cornell Bull. 15.
On *Sanicula* sp. Lee County, 1892 (*Atkinson*).

GRAPHIOLA Poit.

Graphiola congesta Berk. & Rav.
Ala. Bull. 207.
On *Sabal adansonii*. Lee County, July, 1896 (*Underwood & Earle*).

Order UREDINALES.

Family MELAMPSORACEAE.

CHRYSOMYXA Unger.

Chrysomyxa albida Kuehn.
Ala. Bull. 211. Cornell Bull. 16.
On *Rubus argutus* (*R. villosus*). Macon County, Shorter, July 16, 1890 (*Atkinson*); Lee County, Auburn, July 22, 1890, October 26, 1891 (*Atkinson*).

COLEOSPORIUM Lév.

Coleosporium amsoniae (Fkl.) Underw. & Earle.
Peters coll. Ala. Bull. 211.
On *Amsonia amsonia*. 1864 (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).

Coleosporium elephantopodis (Schw.) Thuem.
Ala. Bull. 211. Cornell Bull. 16. In both as *C. sonchi-arvensis* (Pers.) Lév. in part.
On *Elephantopus carolinianus*. Lee County, 1890 (*Atkinson, Duggar*).
On *Elephantopus tomentosus*. Lee County, 1891 (*Bennett, Newman*).
On *Elephantopus nudatus*. Macon County, 1890 (*Atkinson*).

Coleosporium ipomoeae (Schw.) Burrill.
Ala. Bull. 211. Cornell Bull. 17.
On *Ipomoea* sp. Lee County, 1890 (*Atkinson*).
On *Convolvulus sepium*. Lee County, September 8, 1891 (*Atkinson*).
On *Ipomoea purpurea*. Lee County, Auburn, August 17 (*Duggar*); September, 1891 (*Newman*).
On *Ipomoea pandurata*. Lee County, July, 1896 (*Underwood & Earle*).
Very abundant.

Coleosporium sonchi-arvensis (Pers.) Lév.
Ala. Bull. 211. Cornell Bull. 16.
On *Aster dumosus, A. puniceus, A. tradescanti*, and *A. undulatus*. Lee County, 1891 (*Atkinson*).
On *Helianthus* sp. Lee County, 1891 (*Duggar, Atkinson*).
On *Lacinaria graminifolia*. Lee County, 1891 (*Duggar*).
On *Solidago rugosa* and *S. caesia*. Lee County, 1891 (*Atkinson*).
On *Solidago canadensis*. Lee County, 1891 (*Newman*).
On *Solidago* sp. DeKalb County, May, 1896 (*Underwood*).
Ohio. Europe.

Coleosporium vernoniae B. & C.
Grevillea, **3**:57. Ala. Bull. 212. Cornell Bull. 16.
On leaves of *Vernonia* sp. (*Beaumont*).
On leaves of *Vernonia altissima*. Lee County, Auburn (*Atkinson*).
On *Vernonia* sp. Lee County, October, 1895 (*Underwood*).
Louisiana, Ohio.

MELAMPSORA Castagn.

Melampsora farinosa (Pers.) Schroeter.
Ala. Bull. 213. Cornell Bull. 17.
On *Salix fragilis*. Lee County, 1891 (*Atkinson*).
On leaves of *Salix nigra*. Lee County (*Atkinson, Duggar*).
On *Salix* sp. Lee County, 1891 (*Duggar*).
Nebraska.

Melampsora populina (Jacq.) Lév.
Ala. Bull. 213. Cornell Bull. 17.
On *Populus deltoides* (*P. monilifera*). Macon County, August, 1896 (*Carver*).
On leaves of *Populus grandidentata*.[1] Lee County, 1889 (*Atkinson*).
On *Salix* sp. Macon County, August, 1896 (*Carver*).
Nebraska. Europe.

Melampsora scolopendri (Fkl.) Farlow.
Ala. Bull. 213.
On *Woodwardia areolata*. Macon County, August, 1896 (*Carver*).

Melampsora crotonis (Cooke) Burrill.
Cornell Bull. 20, as *Pucciniastrum crotonis* (Burrill) DeToni.
On stems of Croton. Madison County, Huntsville, September 9, 1892 (*Atkinson*).

PUCCINIASTRUM Otth.

Pucciniastrum vacciniorum (Link) Dietel.
Ala. Bull. 218, as *Thecopsora vaccinorum* (Link) Karst.
On *Vaccinium corymbosum*, erroneously reported as *Xolisma ligustrina*. Lee County, October, 1896 (*Earle*).

Pucciniastrum agrimoniae-eupatoriae (DC.) Lagerh.
Ala. Bull. 214. Cornell Bull. 22. In both as *Caeoma agrimoniae* Schw.
On leaves of *Agrimonia parviflora*. Lee County, Auburn, November 2, 1891 (*Duggar*).
On *Agrimonia mollis* (?). Lee County, May, 1896 (*Underwood & Earle*).

Family PUCCINIACEAE.

GYMNOSPORANGIUM Hedw. f.

Gymnosporangium clavipes C. & P.
Ala. Bull. 212; same, 218, as *Roestelia aurantiaca* Peck. Cornell Bull. 17.
On *Juniperus virginiana*. Lee County, 1891 (*Atkinson*); Lee County, 1892 (*Duggar*).
In the Roestelia stage:
On *Cydonia vulgaris*. Lee County, 1891 (*Atkinson, Newman*)
On Crategus. Lee County 1891, 1892 (*Atkinson*); Benton County, 1891, 1892 (*Duggar*).
On *Cydonia japonica* (*Atkinson*).
Very common.
New Jersey.

Gymnosporangium globosum Farlow.
Ala. Bull. 212.
On *Juniperus virginiana*. Lee County, March, 1896 (*Underwood & Earle*).

Gymnosporangium macropus Link.
Ala. Bull. 212; same, 218, as *Roestelia pirata* (Schw.) Thaxter. Cornell Bull. 17.
On *Juniperus virginiana*. Lee County, 1890 (*Atkinson*).
In the Roestelia stage:
On *Malus coronaria* and *M. malus*. Lee County, August, 1890 (*Atkinson*).
On *Crataegus spathulata*. Lee County, October, 1895 (*Underwood*).
On *Malus angustifolia*. Lee County, March, 1896 (*Underwood & Earle*).
On *Malus coronaria*. Lee County, July, 1896 (*Underwood & Earle*).
New Jersey.

---

[1] This host must be *P. heterophylla*, *P. grandidentata* not being known to occur in Alabama.

Gymnosporangium nidus-avis Thaxter.

Ala. Bull. 212.

On *Juniperus virginiana*. Lee County, March, 1896 (*Underwood & Earle*).

Rare.

Gymnosporangium flaviformis (Atkinson).

Ala. Bull. 212, as *Gymnosporangium* sp.; Ala. Bull. 218, as *Roestelia flaviformis* Atkinson.

On *Juniperus virginiana*. Lee County, March, 1896 (*Underwood & Earle*).

In the Roestelia stage:

On *Crataegus spathulata*. Lee County, October, 1895 (*Underwood*).

The suspected connection between the aecidial and teleutosporic forms has been abundantly proved by cultural experiments conducted by Dr. Roland Thaxter at Cambridge and by the writer (F. S. Earle) at Auburn. A full description is in preparation by Dr. Thaxter.

UROMYCES Link.

Uromyces andropogonis Tracy.

Ala. Bull. 219. Cornell Bull. 20.

On *Andropogon virginicus*. Lee County, 1891 (*Duggar*); Macon County, August, 1896 (*Carver*).

On *Andropogon* sp. Lee County, October, 1895 (*Underwood*).

Uromyces elegans (B. & C.) Lagerh.

Ala. Bull. 220, as *U. medicaginis-falcatae* (DC.) Winter. Cornell Bull. 20, as *U. trifolii* (Hedw.) Lév.

On *Trifolium carolinianum*. Lee County, 1890 (*Atkinson*).

Uromyces eragrostidis Tracy.

Ala. Bull. 219. Cornell Bull. 20.

On *Eragrostis tenuis*. Lee County, Auburn, October 11, 1891 (*Duggar*).

Uromyces euphorbiae (Schw.) B. & C.

Cornell Bull. 20.

On leaves of *Euphorbia nutans*. Lee County, Auburn, October, November, 1891 (*Duggar*).

Nebraska.

Uromyces hedysari-paniculati (Schw.) Farlow.

Peters coll., as *Uredo appendiculata*. Ala. Bull. 219. Cornell Bull. 21.

On *Meibomia rotundifolia*. Macon County, August, 1896 (*Carver*).

On *Meibomia paniculata*. Lee County, September 13, 1891 (*Atkinson*).

On Meibomia. 1858 (*Peters*). Crenshaw County, Lapine, September 8, 1890 (*Atkinson*); Perry County, 1891 (*Atkinson*).

Louisiana, Ohio, Nebraska.

Uromyces hyperici (Schw.) Curt.

Ala. Bull. 219. Cornell Bull. 20.

On leaves and stems of *Hypericum mutilum*. Prague Junction, September 6, 1890 (*Atkinson*); Lee County, Auburn, October 29, November 15, 1891 (*Duggar, Atkinson*); October, 1896 (*Earle*).

On *Hypericum virginicum*. Lee County, November, 1895 (*Underwood*).

New Jersey, Ohio.

Uromyces junci Desm.

Ala. Bull. 219. Cornell Bull. 21.

On stems of *Juncus* sp. Lee County, Auburn, August, November, 1891 (*Atkinson*).

Nebraska.

Uromyces lespedezae (Schw.) Peck.

Ala. Bull. 219. Cornell Bull. 20.[1]

On *Lespedeza procumbens*. Lee County, 1891 (*Newman, Duggar*).

On *Lespedeza hirta*. Lee County, autumn, 1891 (*Atkinson*).

On *Lespedeza repens*. Lee County, autumn (*Atkinson*).

On *Lespedeza sturei* and *L. virginica*. Lee County, autumn, 1890 (*Atkinson*).

On *Lespedeza violacea, L. reticulata*, and *L. capitata*. Lee County, Auburn, autumn (*Atkinson*).

On *Lespedeza* sp. Macon County, August, 1896 (*Carver*).

Ohio, New Jersey, Nebraska.

---

[1] See also Lagerheim, Uredin. Herb. Fries. 38.

Uromyces minutus Dietel.

Cornell Bull. 21.

On *Carex* sp. Lee County, Auburn, August 27, 1891 (*Duggar*).

Uromyces phaseoli (Pers.) Winter.

Peters coll., as *Uredo leguminosorum*. Ala. Bull. 219. Cornell Bull. 20. In both as *U. appendiculatus* (Pers.) Link.

On *Phaseolus vulgaris*, the pole bean. Mobile County, 1890 (*Atkinson*). Lee County, Auburn, July to October, 1890 (*Atkinson*).

On *Phaseolus* sp. (*Beaumont*).

Europe.

Uromyces polygoni (Pers.) Fkl.

Ala. Bull. 220. Cornell Bull. 20.

On leaves of *Polygonum setaceum*. Lee County, Auburn, June, 1890, September 8, 1891 (*Atkinson*).

On *Polygonum* sp. Lee County, Auburn, August 18, 1891 (*Duggar*); Hale County, Gallion, 1892 (*Duggar*).

New Jersey, Nebraska.

Uromyces rhynchosporae E. & E.

Ala. Bull. 220. Cornell Bull. 20.

On *Rynchospora glomerata*. Lee County, Auburn, July to October, 1890-91 (*Duggar, Atkinson*).

On *Rynchospora* sp. Macon County, August, 1896 (*Carver*).

Uromyces spermacoces (Schw.) Curt.

Ala. Bull. 220. Cornell Bull. 20.

On *Diodia teres*. Macon County, 1891 (*Atkinson*); October, 1896 (*Carver*). Lee County, Auburn, July 25, 1890 (*Atkinson*); 1893 (*Duggar*).

Uromyces toxicodendri Berk. & Rav.

Grevillea, 3: 58, as *Pileolaria brevipes* Berk. & Rav. Ala. Bull. 220. Cornell Bull. 21. In the two latter as *U. terebinthi* (DC.) Winter.

On *Rhus toxicodendron* (*Beaumont*). Perry County, Uniontown, July 2, 1890 (*Atkinson*); Lee County, Auburn, October 28, 1891 (*Atkinson*).

New Jersey.

Uromyces trifolii (A. & S.) Winter.

Ala. Bull. 220. Cornell Bull. 20.

On *Trifolium hybridum*. Lee County, 1891 (*Atkinson*).

On *Trifolium pratense*. Lee County, 1891 (*Newman, Duggar*); Madison County, May, 1896 (*Underwood & Earle*).

On *Trifolium* sp. Lee County, 1890 (*Atkinson*).

Nebraska. Europe.

PUCCINIA Pers.

Puccinia americana Lagerh.

Ala. Bull. 213, as *P. andropogi* Schw.

On *Andropogon argyraeus*. Lee County, 1891 (*Atkinson*).

On *Andropogon furcatus* and *A. scoparius*. Lee County, 1891 (*Duggar*).

On *Andropogon virginicus*. Lee County, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*).

On *Andropogon* sp. Lee County, 1891 (*Duggar*).

Our Alabama material seems to belong to this species rather than to *P. andropogi*, as the two are distinguished by Lagerheim.

Puccinia amorphae Curt.

Ala. Bull. 220, under Uropyxis.

On *Amorpha fruticosa*. Macon County, 1890 (*Atkinson*); Lee County, October, 1895 (*Earle*).

Puccinia angustata Peck.

Ala. Bull. 214. Cornell Bull. 19.

On *Scirpus cyperinus eriophorum*. Lee County, Auburn, November 8, 1891 (*Atkinson*).

Puccinia argentata (Schultz) Winter.

Ala. Bull. 214. Cornell Bull. 18.

On leaves of *Impatiens biflora*. Lee County, Parkinson's Mill, near Auburn, June 30, 1890, October 11, 1891 (*Atkinson*).

New Jersey, Ohio. Europe.

Puccinia asperifolia (Pers.) Wittst.

Ala. Bull. 216. (Cornell Bull. 18. In both as *P. rubigovera* (Uredo stage).
On *Avena sativa*. Lee County, 1890 (*Atkinson*).
On leaves of *Hordeum vulgare*. Perry County, Uniontown, July 11, 1890 (*Atkinson*).
On *Secale cereale*. Lee County, May, 1896 (*Underwood & Earle*).

Puccinia asteris Duby.

Ala. Bull. 214. Cornell Bull. 17.
On *Aster* sp. Lee County, Auburn, October 22, 1891 (*Duggar*); Dekalb County, May, 1896 (*Underwood*).
Lagerheim[1] follows Dietel rather doubtfully in referring here also *P. silphii* Schw. and *P. xanthii* Schw.
Ohio, Nebraska. Europe.

Puccinia atkinsonii Dietel.

Cornell Bull. 19.
On *Carex lurida*. Lee County, Auburn, August 29, October 11, 1891 (*Atkinson*); September 22, 1891 (*Duggar*). Dekalb County, May, 1896 (*Underwood*).

Puccinia caricis (Schum.) Rebent.

Ala. Bull. 214. Cornell Bull. 18.
On *Carex lurida*. Lee County, 1891 (*Atkinson*).
On *Carex* sp. Lee County, August 29, 1891 (*Duggar*).
New Jersey. Europe.

Puccinia clavisporâ Ell. & Barth.

Ala. Bull. 214.
On *Chrysopogon avenaceus*. Lee County, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Macon County, August, 1896 (*Carver*).

Puccinia convolvuli Cast.

Ala. Bull. 214.
On *Convolvulus* sp. Dekalb County, May, 1896 (*Underwood*).
Nebraska. Europe.

Puccinia emaculata Schw.

Ala. Bull. 214. Cornell Bull. 17.
On *Panicum maximum*.[2] Lee County, 1891 (*Duggar, Newman*).
On *Panicum virgatum*. Lee County, September 14, 1891 (*Atkinson*); March, 1896 (*Underwood & Earle*).
Ohio, Nebraska.

Puccinia fuirenae Cooke.

Ala. Bull. 214. Cornell Bull. 18.
On the leaves, sheaths, and culms of *Fuirena* sp. Lee County, Auburn, November 3, 1891 (*Duggar*).
On *Fuirena squarrosa*. Lee County, July, 1896 (*Underwood & Earle*).

Puccinia helianthi Schw.

Ala. Bull. 217, as *P. tanaceti* DC. Cornell Bull. 17.
On *Helianthus angustifolius*. Lee County, Auburn, October 15, 1891 (*Atkinson*).
On *Helianthus annuus*. Lee County, Auburn, August 24, 1891 (*Atkinson*).
On *Helianthus tuberosus*. Lee County, Auburn, September 10, 1891 (*Atkinson*); Macon County, August, 1896 (*Carver*).
On *Helianthus* sp. Lee County, 1890 (*Atkinson*).
New Jersey, Ohio, Nebraska. Europe.

Puccinia heterospora B. & C.

Ala. Bull. 214. Cornell Bull. 18.
On *Sida spinosa*. Montgomery County, 1891 (*Atkinson*). Lee County, October, 1895 (*Earle*).

Puccinia hieracii (Schum.) Mart.

Ala. Bull. 214. Cornell Bull. 18.
On leaves, stems, and bracts of *Sitilias caroliniana*. Lee County, 1890 (*Atkinson*); 1891 (*Newman*).
On *Carduus* sp. Lee County, Auburn, October 28, 1891 (*Atkinson*).
New Jersey, Nebraska. Europe.

---

[1] Uredin. Herb. Fries. 50.

[2] See below, *Puccinia virgata*.

Puccinia hydrocotyles (Mont.) Cooke.

Ala. Bull. 215. Cornell Bull. 18.
On *Hydrocotyle umbellata*. Lee County, Auburn, November 9, 1891 (*Duggar*).

Puccinia investita Schw.

Ala. Bull. 215.
On *Gnaphalium purpureum*. Lee County, 1890 (*Atkinson*).

Puccinia lateritia B. & C.

Rav. Fung. Car. Exsic. **3**:93. Ala. Bull. 215.[1]
On *Spermacoce glabra* (*Peters*).

Puccinia lobeliae Gerard.

On *Lobelia puberula*. Lee County (*Earle & Baker*).

Puccinia menthae Pers.

Ala. Bull. 215. Cornell Bull. 18.
On *Salvia azurea grandiflora*. Van Dorn County, August 15, 1894 (*Duggar*).
On *Koellia* sp. Montgomery County, Highland Park, October, 1891 (*Atkinson*); Lee County, 1891 (*Atkinson*).
New Jersey, Ohio, Nebraska. Europe.

Puccinia minuta Dietel.

Cornell Bull. 19.
On *Carex verrucosa*. Lee County, Auburn, August 29, 1891 (*Atkinson*).

Puccinia nigro-velata Ell. & Tracy.

Cornell Bull. 18.
On *Cyperus retrofractus*. Lee County, Auburn, September 12, 1891 (*Duggar*).
On *Cyperus rotundus*. Lee County, Auburn, September 12, 1891 (*Duggar*).
On *Cyperus echinatus*. Lee County, August, 1897 (*Earle & Baker*).
This is said by Arthur to be the same as *P. cyperi* Arth.

Puccinia panici Dietel.

On *Panicum virgatum*. Lee County, October, 1897 (*Earle & Baker*).

Puccinia poculiformis (Jacq.) Willd.

Ala. Bull. 214. Cornell Bull. 19. In both as *P. graminis* Pers.
On *Sporobolus asper*. Lee County, 1889 (*Newman*).
On leaves of *Secale cereale*. Lee County, Auburn, February 14, 1890 (*Atkinson*).
On *Sieglingia seslerioides*. Lee County, October, 1895 (*Underwood*).
On *Triticum vulgare*. Lee County, May, 1896 (*Underwood & Earle*).
On *Hordeum vulgare*. Lee County, July, 1896 (*Underwood & Earle*).
This determination needs revision. It is probable that as the species is now understood some of these specimens should be excluded.

Puccinia podophylli Schw.

Ala. Bull. 215.
On *Podophyllum peltatum*. Lee County, April, 1896 (*Underwood & Earle*); Hale County, May, 1896 (*Underwood*); Madison County, May, 1896 (*Underwood*); Dekalb County, May, 1896 (*Underwood*).
Ohio.

Puccinia polygoni-amphibii Pers.

Ala. Bull. 215.
On *Polygonum* sp. Lee County, 1889 (*Atkinson*).
On *Polygonum pennsylvanicum*. Lee County, 1890 (*Atkinson*), 1891 (*Duggar*).
Nebraska. Europe.

Puccinia polysora Underwood, Bull. Torr. Club, **24**:86. 1897.

Ala. Bull. 215. Cornell Bull. 18.
On *Tripsacum dactyloides*. Lee County, Auburn, October 14, 1891 (*Duggar*); Mobile County, October, 1896 (*S. M. Tracy*).

Puccinia pruni-spinosae Pers.

Ala. Bull. 216. Cornell Bull. 18.
On leaves of *Prunus americana*. Lee County, Auburn, October 29, 1891 (*Duggar*).
On leaves of *Prunus serotina*. Lee County, Auburn, October 3, 1891 (*Duggar*).
On leaves of *Prunus angustifolia*. Lee County, Auburn, October 25, 1890 (*Atkinson*).
On leaves of *Amygdalus persica*. Macon County, October, 1896 (*Carver*).
Nebraska. Europe.

[1] See also Lagerheim, Uredin. Herb. Fries. 63.

Puccinia purpurea Cooke.

Ala. Bull. 216. Cornell Bull. 19.
On *Sorghum halepense*. Perry County, Uniontown, October, 1892 (*Duggar*); Macon County, October, 1896 (*Carver*).

Puccinia rhamni (Pers.) Wittst.

Cornell Bull. 19, as *P. coronata* Corda.
On leaves of *Avena sativa*. Lee County, Auburn, spring, 1890 (*Atkinson*).
Ohio, New Jersey.

Puccinia sanguinea Dietel.

Cornell Bull. 19.
On *Sorghum vulgare*, the Kafir corn. Lee County, Auburn, December 22, 1888 (*Atkinson*).

Puccinia saniculae Grev.

Ala. Bull. 216.
On *Sanicula* sp. Lee County, 1891 (*Benton*); Hale County, May 5, 1896 (*Underwood*); Tuscaloosa County, 1896 (*Earle*).

Puccinia seymeriae Burrill.

Cornell Bull. 19.
On leaves of *Gerardia tenuifolia*. Perry County, Uniontown, September 4, 1894. Determined by Mr. Duggar.

Puccinia silphii Schw.[1]

Ala. Bull. 216. Cornell Bull. 18.
On *Silphium laevigatum*. Lee County, Auburn, July, 1891 (*Atkinson*).
On *Silphium asteriscus*. Lee County, April, July, 1896 (*Underwood & Earle*).
Ohio, Nebraska.

Puccinia sorghi Schw.

Ala. Bull. 215, 216, partly as *P. maydis* Carradori. Cornell Bull 17.
On *Sorghum cernuum*. Lee County, 1888 (*Newman*).
On leaves of *Zea mays*. Lee County, Auburn, 1889 (*Atkinson*); August, 1891 (*Newman*). Montgomery County, Mathews, October 10, 1891 (*Atkinson*).
New Jersey, Ohio, Nebraska. Europe.

Puccinia spegazzinii De Toni.

Ala. Bull. 216. Cornell Bull. 18.
On *Willughbya scandens*. Lee County, Auburn, August, September, November, 1891 (*Duggar*).

Puccinia spermacocis B. & C.

Grevillea, **3**:53. Ala. Bull. 216.
On *Spermacoce glabra* (*Peters*).
Probably the same as *P. lateritia*, or possibly only *Uromyces spermacoces*.

Puccinia stromatica B. & C.

Grevillea, **3**:53. Ala. Bull. 216.[2]
On stems of *Clematis* sp. (*Peters*).

Puccinia verbesinae Schw.

Ala. Bull. 211, under Aecidium. Cornell Bull. 19.[2]
On leaves of *Verbesina occidentalis*. Mobile County, July 14, 1890 (*Atkinson*); Dekalb County, July, 1896 (*Underwood & Earle*).

Puccinia violae (Schum.) DC.

Ala. Bull. 217. Cornell Bull. 17.
On *Viola* sp. Lee County, Auburn, January 23, 1890 (*Atkinson*); July 22, 1890 (*Atkinson*); November 9, 1891 (*Atkinson*).
On *Viola blanda*. Winston County, June, 1896 (*Underwood*).
Nebraska. Europe.

Puccinia virgata Ell. & Ev.

On *Panicum virgatum*. Lee County, January, 1897 (*Earle & Baker*).
It is probable that some of the specimens on this host material cited in Alabama Bulletin, page 214, and Cornell Bulletin, page 17, under *P. emaculata* belong here.

---

[1] See note under *P. asteris*.

[2] See also Lagerheim, Uredin. Herb. Fries.

Puccinia windsoriae Schw.

Ala. Bull. 214. Cornell Bull. 17. In both as *P. emaculata.*

On *Sieglingia seslerioides.* Lee County, Auburn, October 7, 1891 (*Atkinson*); September 30, 1891 (*Newman*).

Puccinia xanthii Schw.

Ala. Bull. 217. Cornell Bull. 17.

On *Xanthium canadense.* Perry County, 1891 (*Newman*); Macon County, August, 1896 (*Carver*).

On leaves of *Xanthium strumarium.* Lee County, Auburn, August, 1890 (*Atkinson*); October, November, 1895 (*Underwood*).

Louisiana, Ohio, New Jersey, Nebraska.

Puccinia xanthii ambrosiae Berk. & Rav.

Cornell Bull. 17.

On leaves of *Ambrosia trifida.* Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*); Montgomery County, Hope Hull, August, 1891 (*Atkinson*).

GYMNOCONIA Lagerh.

Gymnoconia hyptidis (Curt.) Lagerh. *Uredo hyptidis* Curt.

Lagerheim, Uredin. Herb. Fries.

On *Mesosphaerum rugosum* (*Hyptis radiata*). Specimens in the herbarium of Fries communicated by M. A. Curtis.

Gymnoconia interstitialis (Schlecht.) Lagerh.

Ala. Bull. 211, as *Caeoma nitens* Schw. Cornell Bull. 18, as *Puccinia pekiana.*

On leaves of *Rubus trivialis.* Lee County, Auburn (*Atkinson*); Mobile County, 1891 (*Zimmer*).

On *Rubus argutus* (*R. villosus*). Lee County, 1891 (*Atkinson*).

On *Rubus* sp. Lee County, April, 1896 (*Underwood & Earle*).

PHRAGMIDIUM Link.

Phragmidium obtusum (Str.) Schum. & Kunze.

Ala. Bull. 213, as *P. fragariastri* (DC.) Schw. Cornell Bull. 17.

On *Duchesnea indica.* Uredo stage: Mobile County, April, July, 1891 (*Atkinson*); Lee County, February, April, 1896 (*Underwood & Earle*); Tuscaloosa County, May, 1896 (*Underwood*).

Teleutospores not seen.

New Jersey. Europe.

Phragmidium rubi-idaei (Pers.) Wint.

Ala. Bull. 213.

On *Rubus cuneifolius.* Lee County, July, 1896 (*Underwood & Earle*).

Europe.

Phragmidium speciosum Fr.

Ala. Bull. 218, as *Uredo miniata.*

On *Rosa humilis.* Lee County, May, 1897 (*Earle & Baker*). Teleutospores on the stems; uredospores on the leaves.

New Jersey, Ohio, Nebraska.

UREDO Lév.

Uredo alabamensis Dietel.

Cornell Bull. 22.

On *Chrysopogon avenaceus.* Lee County, Auburn, October, 1891 (*Duggar*).

Uredo azaleae Schw.

Ala. Bull. 218. Cornell Bull. 22.

On *Azalea nudiflora.* Lee County, Auburn, November 9, 1891 (*Benton*).

Uredo fici Cast.

Ala. Bull. 218. Cornell Bull. 22.

On *Ficus carica.* Mobile County (*Atkinson*); Lee County Auburn (*Atkinson*); Perry County, Uniontown (*Atkinson*).

Louisiana.

Uredo muhlenbergiae Dietel.

Cornell Bull. 22.

On leaves of *Muhlenbergia diffusa.* Lee County, Auburn, August 31, 1890 (*Atkinson*).

Uredo muelleri Schmidt.

Cornell Bull. 22.
On leaves of *Rubus argutus* (*R. villosus*). Lee County, Auburn, autumn (*Atkinson*).

Uredo quercus Biond.

Ala. Bull. 209. Cornell Bull. 22.
On leaves of *Quercus alba*. Lee County, Auburn, September 13, 1891 (*Atkinson*).
On leaves of *Quercus minor*. Lee County, Auburn, October 3, 1891 (*Atkinson*).
On leaves of *Quercus nigra* (*Q. aquatica*). Lee County, Auburn, November 5, 1891 (*Duggar*).
On leaves of *Quercus* sp. Lee County, Auburn, October 25, 1891 (*Atkinson*).

PERIDERMIUM Chev.

Peridermium cerebrum Peck.

Ala. Bull. 213. Cornell Bull. 22.
On *Pinus taeda*. Lee County, April, 1896 (*Underwood & Earle*).
On *Pinus echinata*. Lee County, 1896 (*Underwood & Earle*).
On *Pinus virginiana*. Winston County, June, 1896 (*Underwood*).
New Jersey.

Peridermium orientale Cooke.

Ala. Bull. 213. Cornell Bull. 22.
On leaves of *Pinus serotina*. Lee County, Auburn, spring, 1891 (*Atkinson*).
On *Pinus taeda*. Lee County, April, 1896 (*Underwood & Earle*).
On *Pinus palustris*. Lee County, April, 1896 (*Underwood & Earle*).
On *Pinus* sp. Macon County, April, 1896 (*Underwood*); Dekalb County, May, 1896 (*Underwood*).

AECIDIUM Pers.

Aecidium asterum Schw.

Ala. Bull. 208. Cornell Bull. 21.
On *Aster* sp. Dekalb County, May, 1896 (*Underwood*).
On *Solidago auriculata*. Lee County, 1892 (*Duggar*).
On *Solidago* sp. Lee County, 1891 (*Newman & Duggar*); Dallas County, May, 1896 (*Underwood*); Dekalb County, May 1896 (*Underwood*).
Ohio, Nebraska.

Aecidium compositarum Mart.

Ala. Bull. 208.
On *Eupatorium purpureum*. Dekalb County, May, 1896 (*Underwood*).
On *Eupatorium verbenaefolium*. Dekalb County, May, 1896 (*Underwood*).
On *Helianthus* sp. Madison County, May, 1896 (*Underwood*).
On *Silphium* sp. Lee County, May, 1896 (*Underwood & Earle*).
Louisiana, Ohio, New Jersey, Nebraska.

Aecidium epilobii DC.

Ala. Bull. 209. Cornell Bull. 21.
On *Oenothera laciniata*. Lee County, Auburn, April, May, 1892 (*Atkinson*).
Ohio. Europe.

Aecidium euphorbiae Gmel.

Ala. Bull. 209. Cornell Bull. 21.
On leaves of *Euphorbia maculata*. Lee County, Auburn, November 11, 1891 (*Atkinson*).
Ohio, New Jersey, Nebraska. Europe.

Aecidium fraxini Schw.

On *Fraxinus* sp. Lee County, June, 1897 (*Earle & Baker*[1]).

Aecidium geranii Peck.

Ala. Bull. 209.
On *Diospyros virg.* Madison County, May, 1896 (*Underwood*).

Aecidium gnaphalii Schw.

Ala. Bull. 209.
On *Gnaphalium purpureum*. Lee County, July, 1896 (*Underwood & Earle*).

Aecidium hibisciatum Schw.

Ala. Bull. 209.
On *Hibiscus coccineus* (*Peters*).

---

[1] See also Lagerheim, Uredin. Herb. Fries.

Aecidium hunstonianum Schw. (?)

Ala. Bull. 209, as *A. oldenlandiarum* Ell. & Tracy. Cornell Bull. 21.
On leaves of *Houstonia purpurea*. Lee County, Auburn, February 16, 1890 (*Atkinson*).
The specific position of these specimens is uncertain. They differ widely from the tropical *A. hunstonianum*, but they are certainly not *A. oldenlandiarum*, which is on a very different host (*Earle*).

Aecidium hydnoideum B. & C.

Rav. Fung. Car. Exsic. 4:94. Ala. Bull. 209.[1]
On *Dirca palustris* (*Peters*). Winston County, June, 1896 (*Underwood*).
Ohio.

Aecidium hypericorum B. & C.

Ala. Bull. 209.
On *Hypericum* sp. (*Peters*). A doubtful species.

Aecidium impatientis Schw.

Ala. Bull. 209. Cornell Bull. 21.
On *Impatiens aurea*. Lee County, April, 1896 (*Underwood & Earle*); Dekalb County, May, 1896 (*Underwood*).
On leaves of *Impatiens biflora*. Lee County, Auburn, April 22, 1890 (*Atkinson*); Lee County, Parkinson's Mill near Auburn, spring, 1890 (*Atkinson*).
Ohio, Nebraska.

Aecidium leucosticum B. & C.

Ala. Bull. 209.
On various species of Lespedeza. Dekalb County, May, 1896 (*Underwood*); Madison County, May, 1896 (*Underwood*).

Aecidium lycopi Gerard.

Ala. Bull. 209.
On *Lycopus virginicus*. Lee County, May, 1892 (*Duggar*).

Aecidium mariae-wilsoni Peck.

Peters coll. No. 196, as *Aecidium peterii* B. & C. Ala. Bull. 209.
On *Viola papilionacea* (*V. obliqua*). Lee County, April, 1896 (*Underwood & Earle*).
This is probably the true *A. peterii*; see note under that species. Our Aecidia on species of Viola are greatly in need of revision.
New York.

Aecidium orobi B. & C.

Ala. Bull. 209.
A doubtful species. On *Melhomia* sp. (*Peters*).

Aecidium penstemonis Schw.

Ala. Bull. 200.
On *Penstemon hirsutus*. Lee County, May, 1896 (*Underwood & Earle*).
Nebraska.

Aecidium peterii B. & C.

Ala. Bull. 200.[2]
On *Viola* sp. (*Peters*).
The redescription of this species by Lagerheim and the specimens preserved in the Peters collection under this name (see Ala. Bull. 209) both go to show that it is the species commonly called *A. mariae-wilsoni* Peck by American authors. The specimens on *Viola pedata*, Alabama Bulletin 200, can not therefore belong here. They should probably be considered as the type of a new species.

Aecidium plantaginis Ces.

Ala. Bull. 200. Cornell Bull. 21.
On *Plantago virginica*. Lee County, March, 1896 (*Underwood & Earle*). Only once found.

Aecidium proserpinacae B. & C.

Grevillea, 3:60. Ala. Bull. 200.
On leaves of *Proserpinaca* sp. (*Baumann*).

---

[1] See Lagerheim, Uredin. Herb. Fries. 102.
[2] See also Lagerheim, Uredin. Herb. Fries.

Aecidium pteleae B. & C.
Grevillea, **3**:60. Ala. Bull. 210. Cornell Bull. 21.
On leaves of *Ptelea* sp. (*Peters*).
On leaves of *Ptelea trifoliata*. Lee County, Wright's Mill near Auburn, July 8, 1891 (*Duggar & Newman*).

Aecidium punctatum Pers.
Ala. Bull. 210.
On *Anemone decapetala*. Lee County, April, 1896 (*Underwood & Earle*).
Ohio, Nebraska. Europe.

Aecidium sambuci Schw.
Ala. Bull. 211. Cornell Bull. 21.
On *Sambucus canadensis* (*Peters*). Lee County, Auburn, April, 1892 (*Atkinson*); Lee County, March, 1894 (*Quaintance*).
Ohio, Nebraska.

Aecidium saniculae Carm.
Ala. Bull. 211.
On *Sanicula* sp. Lee County, March, April, 1896 (*Underwood & Earle*).

Order AURICULARIALES.

Family AURICULARIACEAE.

AURICULARIA Bull.

Auricularia auricula-judae (L.) Schroet.
Peters coll. 8. Ala. Bull. 220, under Hirneola.
1864 (*Peters*).
On *Hicoria* sp. Lee County, March, 1896 (*Underwood & Earle*).
Texas, New Jersey, Ohio, Nebraska. Europe.

Auricularia auriformis Schw.
Cornell Bull. 24, under Hirneola.
On decaying branches. Lee County, Auburn (*Atkinson*).
Ohio.
It is very doubtful if this is really different from the last species.

Auricularia scutelliformis B. & C.
Grevillea, **2**: 19. Ala. Bull. 220, under Hirneola.
On branches of Asimina (*Peters*).

Family PILACRACEAE.

PILACRE Fr.

Pilacre faginea (Fr.) B. & Br.
Peters coll. **1**: 195, under Onegyna. Ala. Bull. 222.

Pilacre petersii B. & C.
Rav. Fung. Car. Exsic. **3**: 39. Ala. Bull. 222.
On *Ilex opaca* (*Peters*).
On Carpinus. 1865 (*Peters*).
Europe.

Order TREMELLALES.

Family TREMELLACEAE.[1]

EXIDIA Fr.

Exidia glandulosa (Bull.) Fr.
Ala. Bull. 221.
On *Alnus* sp. Lee County, February, 1896 (*Underwood & Earle*).
On *Quercus* sp. Lee County, March, 1896 (*Underwood & Earle*).
On Liquidambar. Lee County, March, 1896 (*Underwood & Earle*).
South Carolina, New Jersey, Ohio, New England. Europe.

---

[1] These determinations are tentative only. The American species of jelly fungi are greatly in need of critical study.

Exidia truncata Fr.

Ala. Bull. 221; partly (p. 222) as *Ulocolla foliacea* (Pers.) Bref.? Cornell Bull. 24.
On *Vitis rotundifolia*. Lee County, June 3, 1892 (*Atkinson*); February, 1896 (*Underwood & Earle*).
On *Alnus* sp. Lee County, February, 1896 (*Underwood & Earle*).
On *Quercus* sp. Lee County, March, 1896 (*Underwood & Earle*).
Pennsylvania, Ohio. Europe.

TREMELLA Dill.

Tremella dependens B. & C.

Grevillea, 2:19. Ala. Bull. 221.
On Liriodendron (*Peters*).

Tremella encephala Willd.

Grevillea, 2:20. Ala. Bull. 221. In both under Naematelia.
On Quercus (*Peters*).
New Jersey, New England.

Tremella gigantea B. & C.

Grevillea, 2:19. Ala. Bull. 221.
(*Peters.*)

Tremella mesenterica Retz.

Ala. Bull. 221. Cornell Bull. 24.
On decaying wood. Lee County, Auburn, autumn, 1891 (*Atkinson*).
On *Alnus* sp. Lee County, December, 1895 (*Underwood*); February, 1896 (*Underwood & Earle*).
North Carolina, Ohio. Europe.

Tremella nucleata Schw.

Rav. Fung. Car. Exsic. 4:82. Ala. Bull. 221, under Naematelia.
On *Tilia americana* (*Peters*).
South Carolina, New Jersey, Ohio.

Tremella virens Schw.

Cornell Bull. 24.
On decaying oak branches. Lee County, Auburn, autumn, 1891 (*Atkinson*).

Tremella sp.

Peters coll. No. 96. Ala. Bull. 221.
On rotten wood of *Hicoria alba* (*Peters*).

TREMELLODON.

Tremellodon gelatinosum (Scop.) Pers.

Peters coll. No. 62, under Hydnum. Ala. Bull. 222.
On *Pinus* sp. Lee County, March, 1896 (*Underwood & Earle*).
Europe.

Order DACRYOMYCETALES.

Family DACRYOMYCETACEAE.

DACRYOMYCES Nees.

Dacryomyces aurantia (Schw.) Farlow.

Cornell Bull. 24.
On dead wood. Lee County, Auburn, 1890 (*Atkinson*).
South Carolina.

Dacryomyces azaleae Schw.

Cornell Bull. 24.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).

Dacryomyces chrysocomus (Bull.) Tul.

Ala. Bull. 222.
On rotten wood of *Pinus* sp. Lee County, January, February, 1896 (*Underwood & Earle*).
Ohio. Europe.

Dacryomyces deliquescens (Bull.) Dub.
Ala. Bull. 222.
On rotten wood of *Pinus* sp. Lee County, March, 1896 (*Underwood & Earle*).
Louisiana, South Carolina, New Jersey, Ohio.

Dacryomyces epiphyllus Schw.
Cornell Bull. 24.
On leaves of *Arundinaria tecta*. Lee County, Auburn, November 3, 1891 (*Atkinson*).

Dacryomyces stillatus Nees.
Ala. Bull. 222.
On rotten pine, and on other wood. Lee County, February, 1896 (*Underwood & Earle*).
South Carolina, New Jersey, Ohio, New England. Europe.

GUEPINIA Fr.

Guepinia elegans B. & C.
Rav. Fung. Car. Exsic. **5**:23. Ala. Bull. 222.
(*Peters.*)

Guepinia petaliformis B. & C.
Grevillea, **2**:5. Ala. Bull. 222.
On dead wood (*Peters*).

Guepinia spathularia (Schw.) Fr.
Ala. Bull. 223. Cornell Bull. 24.
Lee County, Auburn, 1890 (*Atkinson*).
On Pinus. Lee County. December, 1896 (*Earle*).
On various woods. Lee County, November, December, 1895 (*Underwood*); July, 1896 (*Underwood & Earle*).
Texas, Louisiana, Ohio, New Jersey.

ARRHYTIDIA Berk.

Arrhytidia flava B. & C.
Ala. Bull. 222.
On rotten wood of Pinus. Lee County, February, 1896 (*Underwood & Earle*).

Arrhytidia fulva B. & C.
Peters coll. Ala. Bull. 222.
On rotten wood of Pinus (*Peters*). Lee County, January, 1896 (*Underwood & Earle*).

Order EXOBASIDIALES.

Family EXOBASIDIACEAE.

EXOBASIDIUM Woron.

Exobasidium andromedae Peck.
Ala. Bull. 227.
On *Xolisma ligustrina*. Lee County, May, 1896 (*Underwood & Earle*).
New Jersey.

Exobasidium azaleae Peck.
Ala. Bull. 227.
On calyces of *Azalea nudiflora*. Lee County, 1892 (*Benton*); April, 1896 (*Underwood & Earle*).

Exobasidium discoideum Ellis.
Ala. Bull. 227.
On leaves of *Azalea nudiflora*. Lee County, April, May, 1896 (*Underwood & Earle*); Winston County, June, 1896 (*Underwood*).
New Jersey.

Exobasidium vaccinii (Fkl.) Woron.
Ala. Bull. 227.
On flowers of *Gaylussacia frondosa*. Lee County, May, 1896 (*Underwood & Earle*).
On leaves of Vaccinium. Lee County, April, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

MICROSTROMA Niessl.

Microstroma juglandis (Berenger) Sacc.
Ala. Bull. 138. Cornell Bull. 38.
On living leaves of *Hicoria alba*. Lee County, Auburn, April 28, 1890 (*Atkinson*); Perry County, Uniontown, July 12, 1890 (*Atkinson*).

Order HYMENIALES (Agaricales).

Family HYPOCHNACEAE.

HYPOCHNUS Ehrenb.

Hypochnus anthochrous (Pers.) Fr.
Ala. Bull. 228.
(*Peters.*)

Family THELEPHORACEAE.

CORTICIUM Pers.

Corticium armeniacum Sacc.
Ala. Bull. 223.
On Vitis (*Peters, Beaumont*).

Corticium caeruleum (Schrad.) Fr.
Ala. Bull. 223.
Lee County, November, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*).
South Carolina, Ohio. Europe.

Corticium calceum (Pers.) Fr.
Ala. Bull. 223.
On Pinus. Lee County, January, 1896 (*Underwood & Earle*).
Louisiana, Texas, Pennsylvania. Europe.

Corticium cervicolor B. & C.
Grevillea, **1**: 179. Ala. Bull. 223.
On smooth wood (*Peters*).

Corticium chlorinum B. & C.
Grevillea, **1**: 179. Ala. Bull. 223.
On Tsuga (*Peters*).

Corticium chrysocreas B. & C.
Grevillea, **1**: 178. Ala. Bull. 224.
On Pinus (*Peters*).

Corticium cremoricolor B. & C.
Grevillea, **1**: 180. Ala. Bull. 224.
On Ilex (*Peters*).

Corticium crocicreas B. & C.
Grevillea, **1**: 178. Ala. Bull. 224.
On Vitis (*Peters*).

Corticium deglubens B. & C.
Grevillea, **1**: 166. Ala. Bull. 224.
On Juniperus (*Peters*).

Corticium diminuens B. & C.
Rav. Fung. Car. Exsic. **3**: 31. Grevillea, **2**: 3. Ala. Bull. 224.
On *Ostrya virginiana* (*Peters*).

Corticium dryinum B. & C.
Grevillea, **1**: 179. Ala. Bull. 225.
On Quercus (*Peters*).

Corticium ephebium B. & C.
Grevillea, **1**: 178. Peters coll. No. 80. Ala. Bull. 225.
(*Peters.*)

Corticium evolvens Fr.
Grevillea, **1**: 166. Ala. Bull. 225.
On Liquidambar (*Peters*).
New England.

Corticium filamentosum B. & C.
Grevillea, **1**: 178. Ala. Bull. 225.
(*Peters.*)
Ohio.

Corticium lactescens Berk.
Ala. Bull. 225. Cornell Bull. 28.
On *Alnus rugosa*. Lee County, Auburn, November 2, 1891 (*Duggar*).

Corticium laeve Pers.
Ala. Bull. 225.
On Liquidambar (*Peters*).
Louisiana, South Carolina, New Jersey, Nebraska.

Corticium martianum B. & C.
Rav. Fung. Car. Exsic. **5**: 30. Ala. Bull. 225.
On Betula (*Peters*).

Corticium miniatum Berk. Not Cooke.
Peters coll. No. 85. Ala. Bull. 225.
On Liquidambar (*Peters*).

Corticium oakesii B. & C.
Rav. Fung. Car. Exsic. **3**: 32. Ala. Bull. 226.
On *Ostrya virginiana* (*Peters*). Lee County, January, February, 1896 (*Underwood & Earle*).
New England, New York.

Corticium ochroleucum erimosum Berk.
Grevillea, **1**: 166. Ala. Bull. 226.
On *Sassafras sassafras* (*Peters*).
Louisiana, South Carolina.

Corticium petersii B. & C.
Rav. Fung. Car. Exsic. **5**: 28. Grevillea, **1**: 177. Ala. Bull. 226.
On the ground (*Peters*).
Winston County, June, 1896 (*Underwood*).

Corticium polyporoideum B. & C.
Grevillea, **1**: 177. Peters coll. No. 84. Ala. Bull. 226.
September, 1863 (*Peters*).

Corticium prasinum B. & C.
Rav. Fung. Car. Exsic. **5**: 29. Grevillea, **1**: 179. Peters coll. Ala. Bull. 226.
On the ground. September, 1864 (*Peters*).

Corticium radiosum Fr.
Ala. Bull. 227.
Lee County, 1891 (*Duggar*).

Corticium scutellare B. & C.
Grevillea, **2**: 4. Ala. Bull. 227.
On oak (*Peters*).

Corticium siparium B. & C.
Grevillea, **1**: 177. Ala. Bull. 227.
On Liquidambar (*Peters*).

Corticium viticolum Schw.
Rav. Fung. Car. Exsic. **3**: 34. Ala. Bull. 227.
On *Vitis aestivalis* (*Peters*).
South Carolina.

CONIOPHORA DC.

Coniophora umbrina (A. & S.) Fr.
Peters coll. No. 70. Ala. Bull. 223.
(*Peters.*)
South Carolina, Ohio.

STEREUM Pers.

Stereum albo-badium (Schw.) Fr.
Ala. Bull. 230. Cornell Bull. 28.
On dead oak branches. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On various twigs and branches. Lee County, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*). Common.
Louisiana, South Carolina, Ohio.

Stereum bicolor (Pers.) Fr.
Ala. Bull. 230. Cornell Bull. 28.
On stumps. Lee County, October, 1895 (*Underwood*); February, March, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
Louisiana, Ohio. Europe.

Stereum candidum (Schw.) Fr.
Ala. Bull. 230.
Forming small patches on bark of large oaks. Lee County, December, 1895 (*Underwood*).
Ohio.

Stereum complicatum Fr.
On Carpinus. Lee County, January, 1897 (*Earle & Baker*).
On Hicoria. Lee County, January, 1897 (*Earle & Baker*).
Louisiana, Ohio.

Stereum fasciatum (Pers.) Fr.
Ala. Bull. 230.
On old logs. Lee County, November, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*); December, 1896 (*Earle*).
Ohio.

Stereum frustulosum (Schw.) Fr.
Ala. Bull. 230.
On Quercus. Lee County, November, December, 1895 (*Underwood*); March, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio, Nebraska.

Stereum gausapatum Fr.
Ala. Bull. 230.
(*Peters.*)

Stereum leveillianum B. & C.
Ala. Bull. 230. Cornell Bull. 28.
On dead branches of hickory. Lee County, February 22, 1891 (*Atkinson*).
Lee County, Auburn, November, 1895 (*Underwood*).
South Carolina.

Stereum nivosum Rav.
Ala. Bull. 230.
On Juniperus. Lee County, November, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Common.
New Jersey.

Stereum ochro-flavum Schw.
On Quercus. Lee County, January, 1897 (*Earle & Baker*).
Ohio.

Stereum pergameneum B. & C.
Grevillea, **1**: 161. Ala. Bull. 230.
On decayed wood (*Peters*).

Stereum radians Fr.

Ala. Bull. 231.

On twigs. Lee County, November, December, 1895; January, 1896 (*Underwood & Earle*).

Ohio.

Stereum ravenelii B. & C.

Grevillea, **1**:162. Ala. Bull. 231.

On the earth in swamps (*Peters, Beaumont*).

Stereum sericeum (Schw.) Morgan.

Ala. Bull. 231.

On twigs. Mobile County, December, 1895. Lee County, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Not common.

Ohio.

Stereum spadiceum Fr.

Base of old stumps. Lee County, January, 1897 (*Earle & Baker*).

Louisiana, New Jersey, Ohio. Europe.

Stereum subpileatum B. & C.

Ala. Bull. 231.

Lee County, November, 1895 (*Underwood*); April, 1896 (*Underwood & Earle*); Winston County, June, 1896 (*Underwood*).

Louisiana.

Stereum versicolor (Schw.) Fr.

Ala. Bull. 231. Cornell Bull. 28.

On dead branches. Lee County, February 22, 1891 (*Atkinson*); November, 1895 (*Underwood*). Mobile County, December 1895 (*Earle*). Winston County, June, 1896 (*Underwood*). Common everywhere.

Ohio, New Jersey, Nebraska.

THELEPHORA Ehrh.

Thelephora botryoides (Schw.) Underwood & Earle.

Ala. Bull. 232.

(*Peters.*)

Thelephora candida (Schw.) Fr.

Cornell Bull. 28.

Macon County, Shorter, July 16, 1890 (*Atkinson*).

Thelephora filamentosa B. & C.

Grevillea **1**:148. Ala. Bull. 231.

On decayed herbs (*Peters*).

Ohio.

Thelephora gracilis Peck, Bull. Torr. Club, **25**:371. 1898.

Damp ground. Lee County, July, 1897 (*Earle & Baker*).

Thelephora griseo-zonata Cooke.

Ala. Bull. 232.

On the ground. Lee County, December, 1895 (*Underwood*); October, 1896 (*Earle*).

New Jersey.

Thelephora laciniata Pers.

Cornell Bull. 28.

In sandy places in turpentine orchards. Lee County, Auburn, autumn, 1889 (*Atkinson*); July 27, 1890 (*Atkinson*).

Europe.

Thelephora lobata Bertol.

Mem. Acad. Sci. Bol. **7**:360. Ala. Bull. 232.

Mobile County? (*Gates*).

Thelephora pedicellata Schw.

Ala. Bull. 233.

On Cornus (*Peters*).

On living shrubs (Crataegus, etc.). Lee County, November, 1895 (*Underwood*); February, 1896 (*Underwood & Earle*).

Thelephora retiformis B. & C.
On living branches of Prunus. Lee County, January, 1897 (*Earle & Baker*).

Thelephora schweinitzii Peck.
Peters coll. Ala. Bull. 233. Cornell Bull. 28.
On the ground (*Peters*). Lee County, Auburn, autumn, 1890 (*Atkinson*); October, 1895 (*Underwood*). Winston County, June, 1896 (*Underwood*).
Ohio.

Thelephora scoparia Peck.
On the ground and on roots of grass. Lee County, June, 1897 (*Earle & Baker*).

Thelephora sebacea Pers.
Peters coll., as *Thelephora micheneri* B. & C. Ala. Bull. 233.
On leaves of Viola, etc. (*Peters*).
Incrusting various leaves and stems. Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio, New England. Europe.

Thelephora terrestris Ehrh.
Ala. Bull. 233.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey. Europe.

HYMENOCHAETE Lév.

Hymenochaete agglutinans Ellis.
Ala. Bull. 229.
On living twigs. Lee County, February, 1896 (*Underwood & Earle*).
New Jersey.

Hymenochaete corrugata (Fr.) Lév.
Rav. Fung. Car. Exsic. **5**:26. Ala. Bull. 229.
(*Peters.*)
Lee County, January, February, 1896 (*Underwood & Earle*).
South Carolina, Pennsylvania, Ohio. Europe.

Hymenochaete curtisii (Berk.).
Ala. Bull. 230, under Stereum.
(*Peters.*)
On Quercus (*Earle & Baker*).
South Carolina.

Hymenochaete epichlora (B. & C.) Cooke.
Grevillea, **1**:178, under Corticium. Rav. Fung. Car. Exsic. **5**:24, under Corticium. Ala. Bull. 229.
On Vaccinium (*Peters*).
On Symplocos (*Peters*).

Hymenochaete purpurea Cooke & Morgan.
Ala. Bull. 230. Cornell Bull. 28.
On dead branches. Lee County, Auburn, February 22, 1891 (*Atkinson*); November, 1895 (*Underwood*).
Ohio.

Hymenochaete setosa B. & C.
Grevillea, **1**:165. Ala. Bull. 230.
On Quercus (*Peters*).

CRATERELLUS Pers.

Craterellus cantharellus (Schw.) Fr.
Grevillea, **1**:147, as *C. lateritius* Berk. Ala. Bull. 228. Cornell Bull. 28.
On the ground (*Peters*). Lee County, Auburn, July, 1890 (*Atkinson*); July, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
Ohio.

Craterellus cornucopioides (L.) Pers.
Ala. Bull. 229.
On the ground. Lee County, July, 1896 (*Underwood & Earle*).
North Carolina, South Carolina, Ohio. Europe.

CYPHELLA Fr.

Cyphella fulva B. & Rav.
Ala. Bull. 229.
On Alnus. Lee County, January, February, 1896 (*Underwood & Earle*).
New Jersey, Maine.

Cyphella furcata B. & C.
Grevillea, **2**:5. Ala. Bull. 229.
On Alnus (*Beaumont*).

SOLENIA Hoffm.

Solenia anomala (Pers.) Fr.
Ala. Bull. 247.
On Alnus. Lee County, January, May, 1896 (*Underwood & Earle*).
Europe.

Solenia villosa Fr.
Rav. Fung. Car. Exsic. **5**:42. Ala. Bull. 247.
On Quercus (*Peters*).
Europe.

Family CLAVARIACEAE.

CLAVARIA Vaill.

Clavaria aurea Schaeff.
Ala. Bull. 228.
Lee County, October, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Clavaria botrytis Pers.
Ala. Bull. 228.
Lee County, October, 1896 (*Earle*).
South Carolina, New Jersey, New England, Ohio. Europe.

Clavaria falcata Pers.
Ala. Bull. 228.
(*Peters.*)

Clavaria fragilis Holms.
On the ground. Tallapoosa County, August, 1897 (*Earle*).
South Carolina. Europe.

Clavaria gracilis Pers.
Rav. Fung. Car. Exsic. **5**:34. Ala. Bull. 228.
(*Peters.*)
Europe.

Clavaria longicaulis Peck, Bull. Torr. Club, **25**:371. 1898
Moist earth. Lee County, July, 1897 (*Earle & Baker*).

Clavaria pulchra Peck.
Cornell Bull. 28.
On the ground. Lee County, Auburn, 1890 (*Duggar*).

Clavaria petersii B. & C.
Rav. Fung. Car. Exsic. **5**:33. Grevillea, **2**:7. Ala. Bull. 228.
On dead wood (*Peters*).

Clavaria pistillaris L.
Ala. Bull. 228.
On the ground. Lee County, November, 1896 (*Earle*).
Ohio.

Clavaria pyxidata Pers.
On rotten logs. Lee County, July, 1897 (*Earle & Baker*).
Ohio.

SPARASSIS Fr.

Sparassis crispa (Wulf.) Fr.
Peters coll. No. 91. Ala. Bull. 228.
Lawrence County (*Peters*). Lee County, December, 1896 (*Earle*).

Sparassis herbstii Peck.
Ala. Bull. 228.
On the ground. Lee County, July, 1896 (*Underwood & Earle*).

Family HYDNACEAE.

ODONTIA Fr.

Odontia fimbriata B. & C.
Peters coll. No. 67. Ala. Bull. 236.
Lawrence County (*Peters*).
New Jersey, Ohio. Europe.

Odontia lateritia B. & C.
Rav. Fung. Car. Exsic. **5**:22. Grevillea, **1**:147. Ala. Bull. 236.
On Quercus (*Peters*).

PHLEBIA Fr.

Phlebia radiata Fr.
Peters coll. No. 66. Ala. Bull. 237.
On Liriodendron. 1863 (*Peters*).
Ohio. Europe.

Phlebia zonata B. & C.
Peters coll. Ala. Bull. 237.
On Tilia. July, 1855 (*Peters*).

RADULUM Fr.

Radulum orbiculare Fr.
Ala. Bull. 237.
On dead wood. Lee County, December, 1895 (*Underwood*).
South Carolina, New Jersey, Pennsylvania. Europe.

Radulum spinulosum B. & C.
Grevillea, **1**:146. Ala. Bull. 237.
(*Peters.*)

NEOKNEIFFIA Sacc.

Neokneiffia aspera (Pers.).
Rav. Fung. Car. Exsic. **5**:31. Ala. Bull. 236, under Kneiffiella.
On *Juniperus virginiana* (*Peters*).

Neokneiffia candidissima (B. & C.).
Rav. Fung. Car. Exsic. **5**:32. Ala. Bull. 236, as Kneiffiella.
On *Juniperus virginiana* (*Peters*).
South Carolina, New Jersey, Ohio.

HYDNUM Fr.

Hydnum adustum Schw.
Ala. Bull. 233. Cornell Bull. 28.
Macon County, Shorter, July, 1890 (*Atkinson*); Lee County, 1891 (*Atkinson*); Winston County, June, 1896 (*Underwood*).
New Jersey, Ohio.

Hydnum chrysocomum Underwood.
Ala. Bull. 233.
Under decayed wood. Lee County, November, 1895 (*Underwood*).

CYPHELLA Fr.

Cyphella fulva B. & Rav.
Ala. Bull. 229.
On Alnus. Lee County, January, February, 1896 (*Underwood & Earle*).
New Jersey, Maine.

Cyphella furcata B. & C.
Grevillea, **2**:5. Ala. Bull. 229.
On Alnus (*Beaumont*).

SOLENIA Hoffm.

Solenia anomala (Pers.) Fr.
Ala. Bull. 247.
On Alnus. Lee County, January, May, 1896 (*Underwood & Earle*).
Europe.

Solenia villosa Fr.
Rav. Fung. Car. Exsic. **5**:42. Ala. Bull. 247.
On Quercus (*Peters*).
Europe.

Family CLAVARIACEAE.

CLAVARIA Vaill.

Clavaria aurea Schaeff.
Ala. Bull. 228.
Lee County, October, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Clavaria botrytis Pers.
Ala. Bull. 228.
Lee County, October, 1896 (*Earle*).
South Carolina, New Jersey, New England, Ohio. Europe.

Clavaria falcata Pers.
Ala. Bull. 228.
(*Peters.*)

Clavaria fragilis Holms.
On the ground. Tallapoosa County, August, 1897 (*Earle*).
South Carolina. Europe.

Clavaria gracilis Pers.
Rav. Fung. Car. Exsic. **5**:34. Ala. Bull. 228.
(*Peters.*)
Europe.

Clavaria longicaulis Peck, Bull. Torr. Club, **25**:371. 1898
Moist earth. Lee County, July, 1897 (*Earle & Baker*).

Clavaria pulchra Peck.
Cornell Bull. 28.
On the ground. Lee County, Auburn, 1890 (*Duggar*).

Clavaria petersii B. & C.
Rav. Fung. Car. Exsic. **5**:33. Grevillea, **2**:7. Ala. Bull. 228.
On dead wood (*Peters*).

Clavaria pistillaris L.
Ala. Bull. 228.
On the ground. Lee County, November, 1896 (*Earle*).
Ohio.

Clavaria pyxidata Pers.
On rotten logs. Lee County, July, 1897 (*Earle & Baker*).
Ohio.

SPARASSIS Fr.

Sparassis crispa (Wulf.) **Fr.**
Peters coll. No. 91. Ala. Bull. 228.
Lawrence County (*Peters*). Lee County, December, 1896 (*Earle*).

Sparassis herbstii Peck.
Ala. Bull. 228.
On the ground. Lee County, July, 1896 (*Underwood & Earle*).

Family HYDNACEAE.

ODONTIA Fr.

Odontia fimbriata B. & C.
Peters coll. No. 67. Ala. Bull. 236.
Lawrence County (*Peters*).
New Jersey, Ohio. Europe.

Odontia lateritia B. & C.
Rav. Fung. Car. Exsic. **5**:22. Grevillea, **1**:147. Ala. Bull. 236.
On Quercus (*Peters*).

PHLEBIA Fr.

Phlebia radiata Fr.
Peters coll. No. 66. Ala. Bull. 237.
On Liriodendron. 1863 (*Peters*).
Ohio. Europe.

Phlebia zonata B. & C.
Peters coll. Ala. Bull. 237.
On Tilia. July, 1855 (*Peters*).

RADULUM Fr.

Radulum orbiculare Fr.
Ala. Bull. 237.
On dead wood. Lee County, December, 1895 (*Underwood*).
South Carolina, New Jersey, Pennsylvania. Europe.

Radulum spinulosum B. & C.
Grevillea, **1**:146. Ala. Bull. 237.
(*Peters.*)

NEOKNEIFFIA Sacc.

Neokneiffia aspera (Pers.).
Rav. Fung. Car. Exsic. **5**:31. Ala. Bull. 236, under Kneiffiella.
On *Juniperus virginiana* (*Peters*).

Neokneiffia candidissima (B. & C.).
Rav. Fung. Car. Exsic. **5**:32. Ala. Bull. 236, as Kneiffiella.
On *Juniperus virginiana* (*Peters*).
South Carolina, New Jersey, Ohio.

HYDNUM Fr.

Hydnum adustum Schw.
Ala. Bull. 233. Cornell Bull. 28.
Macon County, Shorter, July, 1890 (*Atkinson*); Lee County, 1891 (*Atkinson*); Winston County, June, 1896 (*Underwood*).
New Jersey, Ohio.

Hydnum chrysocomum Underwood.
Ala. Bull. 233.
Under decayed wood. Lee County, November, 1895 (*Underwood*).

Hydnum cirrhatum Pers.
Ala. Bull. 233.
On Quercus (*Beaumont*).
South Carolina, Ohio. Europe.

Hydnum curtisii Berk.
Lee County, November, 1896 (*Baker*).

Hydnum erinaceus Bull.
Peters coll. No. 60. Ala. Bull. 234.
On Quercus. 1863 (*Peters*).
On old log. Lee County, November, 1896 (*Miss J. Skehan*).
Ohio.

Hydnum fasciculatia B. & C.
Grevillea, **1**: 99. Ala. Bull. 234.
On Hicoria (*Peters*).

Hydnum flabelliforme Berk.
Ala. Bull. 234.
On standing trunks. Lee County, January, 1896 (*Underwood & Earle*).
Ohio.

Hydnum fragilissimum B. & C.
Rav. Fung. Car. Exsic. **5**: 21. Ala. Bull. 234.
(*Peters.*)

Hydnum himantia Schw.
Peters coll. No. 56. Ala. Bull. 234.
(*Peters.*)

Hydnum laeticolor B. & C.
Grevillea, **1**: 99. Ala. Bull. 234.
On Quercus (*Beaumont*).
South Carolina.

Hydnum membranaceum Bull.
Rav. Fung. Car. Exsic. **5**: 20. Ala. Bull. 235.
(*Peters.*)
Europe.

Hydnum mucidum Pers.
Ala. Bull. 235.
On Hicoria (*Peters*).
On logs. Lee County, October, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*).
Ohio. Europe.

Hydnum ochraceum Pers.
Ala. Bull. 235.
On logs. Lee County, October, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*).
Ohio, New Jersey, Nebraska. Europe.

Hydnum pallidum C. & E.
On Salix. Lee County, November, 1897 (*Earle*).

Hydnum parasitans B. & C.
Grevillea, **1**: 100. Ala. Bull. 235.
On *Ulmus americana* (*Peters*).

Hydnum pulcherrimum B. & C.
Ala. Bull. 235. Cornell Bull. 28.
Lee County, summer, 1890 (*Atkinson*); October, December, 1895 (*Underwood*). Hale County, April, 1896 (*Underwood*). Winston County, June, 1896 (*Underwood*).
South Carolina, Ohio.

Hydnum reniforme B. & C.
Cornell Bull. 28.
Lee County, Auburn (*Atkinson*).

Hydnum repandum L.

Peters coll. No. 61. Ala. Bull. 235.
On the ground (*Peters*). Lee County, January, 1896 (*Underwood & Earle*); November, December, 1896 (*Earle*).
South Carolina, Ohio, New Jersey, New England. Europe.

Hydnum rhois Schw. (?).

On Quercus. Lee County, January, 1897 (*Earle & Baker*).

Hydnum septentrionale Fr.

Ala. Bull. 235.
On Tilia (*Peters*).
Ohio. Europe.

Hydnum setulosum B. & C.

Peters coll. No. 59. Grevillea, **1**:100. Ala. Bull. 235.
On Liquidambar (*Peters*).

Hydnum spathulatum (Schw.) Fr.

Ala. Bull. 235.
On decaying wood. Lee County, November, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*).

Hydnum spongiosipes Peck.

Peters coll. No. 57, as *H. ferrugineum* (?). Ala. Bull. 235.
(*Peters.*)

PHAEODON Schroet.

Phaeodon atroviride (Morgan).

Journ. Cincinnati Soc. Nat. Hist. **18**:38. Ala. Bull. 233. Cornell Bull. 28. In all under Hydnum.
On old wood. Lee County, Auburn, 1890 (*Atkinson*).

Phaeodon aurantiacus (Batsch) Schroet.

Lee County, September, 1897 (*Earle & Baker*).
Europe.

Phaeodon compactus (Pers.) Schroet.

Ala. Bull. 234, under Hydnum.
On the ground. Mobile County, December, 1895 (*Earle*).
Europe.

Phaeodon ferrugineus (Fr.) Schroet.

Ala. Bull. 234, under Hydnum.
Lee County, 1891 (*Atkinson*); November, 1896 (*Earle*).
South Carolina, Ohio, Pennsylvania, New Jersey.

Phaeodon imbricatus (L.) Schroet.

Ala. Bull. 234, under Hydnum.
In pine woods. Lee County, December, 1895 (*Underwood*); March, 1896 (*E. F. Lee*); July, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Rather common.
Europe.

Phaeodon subsquamosus (Batsch) Schroet.

Peters coll. No. 55. Ala. Bull. 235, under Hydnum.
On the ground. 1864 (*Peters*).
Europe.

Phaeodon tomentosus (Schrad.) Schroet.

Ala. Bull. 233, as *Caldesiella ferruginosa* (Fr.) Sacc.
(*Beaumont.*) Lee County, May, 1896 (*Underwood & Earle*).
Europe.

Phaeodon zonatus (Batsch).

Ala. Bull. 236, under Hydnum.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

IRPEX Fr.

Irpex coriaceus B. & Rav.

Rav. Fung. Car. Exsic. 3:21. Ala. Bull. 236.
On Quercus. (*Peters.*) Lee County, November, 1895 (*Underwood*).
South Carolina. Cuba, South America.

Irpex fuscescens Schw.

On Quercus. Lee County, November, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*). Not uncommon.

Irpex schweinitzii B. & C.

Grevillea, 1:102. Ala. Bull. 236.
(*Beaumont.*)

SISTOTREMA Pers.

Sistotrema confluens Pers.

On the ground among pine needles. Lee County, January, 1897 (*Earle & Baker*).

Family POLYPORACEAE.

Tribe MERULIEAE.

MERULIUS Hall.

Merulius bellus B. & C.

Grevillea, 1:69. Peters coll. No. 52. Ala. Bull. 238.
On Tsuga. 1858 (*Peters*).

Merulius confluens Schw.

Cornell Bull. 28.
On dead branches. Lee County, Auburn, December, 1891 (*Atkinson*).

Merulius corium Fr.

Peters coll. Ala. Bull. 238.
1855 (*Peters*).
Lee County, January, February, March, July, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Common.
South Carolina, North Carolina, New England. Europe.

Merulius haedinus B. & C.

Rav. Fung. Car. Exsic. 4:8. Grevillea, 1:69. Ala. Bull. 238.
On Tilia (*Peters*).

Merulius porinoides Fr.

Ala. Bull. 239.
On Quercus (*Peters*).
South Carolina, Ohio. Europe.

Merulius serpens Tode.

Ala. Bull. 239.
On Pinus. Lee County, January, 1896 (*Underwood & Earle*).
Europe.

Merulius tremellosus Schrad.

Ala. Bull. 239.
Lee County, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*); November, December, 1896 (*Earle*).
Louisiana, South Carolina, New Jersey, Ohio. Europe.

Tribe POLYPOREAE.

PORIA Pers.

Poria alabamae B. & C.

Cornell Bull. 28.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).

Poria barbaeformis B. & C.

Grevillea, **1**:53. Ala. Bull. 240, under Polyporus.
On Vitis. (*Peters.*) Lee County, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*).

Poria beaumontii B. & C.

Ala. Bull. 240, under Polyporus.
(*Beaumont.*)

Poria callosa Fr.

On rotten wood. Lee County, November, 1897 (*Earle*).

Poria chrysoloma Fr.

Ala. Bull. 240, under Polyporus.
On pine chips. Lee County, January, 1896 (*Underwood & Earle*).

Poria corticola Fr.

Ala. Bull. 241, under Polyporus.
On bark. Lee County, December, 1895 (*Underwood*).
Ohio. Europe.

Poria ferruginosa Schrad.

Ala. Bull. 242, under Polyporus.
On fallen limbs. Lee County, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*).
Ohio. Europe.

Poria pulchella Schw.

Peters coll. Ala. Bull. 245, under Polyporus.
1855 (*Peters*).

Poria purpurea Fr.

Ala. Bull. 245, under Polyporus.
On rotten wood. Lee County, February, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, Ohio. Europe.

Poria vaporaria Pers.

Ala. Bull. 245, under Polyporus.
On various dead branches. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Very common.

Poria vesiculosa B. & C.

Peters coll. No. 39. Grevillea, **1**:65. Ala. Bull. 247, under Polyporus.
On Pinus (*Peters*).

Poria viticola Schw.

Peters coll. No. 38. Ala. Bull. 247, under Polyporus.
On Vitis (*Peters*).

FOMES Fr.

Fomes annosus Fr.

Cornell Bull. 27.
On roots of rotten stumps. Lee County, Auburn, 1890 (*Atkinson*).
Europe.

Fomes applanatus (Pers.) Wallr.

Ala. Bull. 239, under Polyporus.
(*Atkinson.*) Rare in the State.
New Jersey, Ohio, Nebraska. Europe.

Fomes carneus Nees.

Rav. Fung. Car. Exsic. **5**:14. Ala. Bull. 240, under Polyporus. Cornell Bull. 27.
On Juniperus. Winston County (*Peters*).
On dead trunk. Lee County, Auburn (*Atkinson*).
Louisiana, South Carolina, New Jersey, New York.

Fomes connatus Fr. (?)

Ala. Bull. 240, under Polyporus.
On *Gleditsia triacanthos*. Lee County, February, 1896 (*Underwood & Earle*).
Ohio. Europe.

Fomes curtisii Berk.

Ala. Bull. 241, under Polyporus. Cornell Bull. 27.
On dead stump. Lee County, Auburn, 1890 (*Atkinson*).
On Quercus, etc. Lee County, October, November, December, 1895 (*Underwood*); June, July, 1896 (*Underwood & Earle*).
Louisiana, New Jersey.

Fomes hemileucus B. & C.

Ala. Bull. 243, under Polyporus.
On Liriodendron. Lee County, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*).

Fomes lucidus (Leys.) Fr.

Ala. Bull. 244, under Polyporus.
On Tsuga. Winston County, June, 1896 (*Underwood*).
New Jersey, Ohio. Europe.

Fomes obliquus (Pers.) Fr.

Ala. Bull. 244, under Polyporus.
Lee County, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*).
Louisiana, Ohio. Europe.

Fomes reniformis Morgan.

Ala. Bull. 245, under Polyporus. Cornell Bull. 27.
On dead trunk. Lee County, Auburn, 1890 (*Atkinson*).
Lee County, March, 1896 (*Underwood & Earle*); Winston County, June, 1896 (*Underwood*).

Fomes rimosus Berk.

Ala. Bull. 246, under Polyporus.
On *Robinia pseudacacia*. Madison County, May, 1896 (*Underwood*); Dekalb County, May, 1896 (*Underwood*).
(*Atkinson.*)

Fomes scutellatus Schw.

Ala. Bull. 246, under Polyporus.
On branches of Alnus. January, 1896 (*Underwood & Earle*).

Fomes supinus Schw.

Ala. Bull. 247, under Polyporus.
On *Prunus angustifolia*. Lee County, November, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Not uncommon.

POLYPORUS Michx.

Polyporus acanthoides (Bull.) Fr.

Peters coll. No. 35. Ala. Bull. 239.
Lawrence County (*Peters*).

Polyporus adustus (Willd) Fr.

Ala. Bull. 239. Cornell Bull. 27.
On dead trunk. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks. Lee County, November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*).
On Hicoria. Lee County, December, 1896 (*Earle*).

Polyporus aneirinus Sommf.

Peters coll. Ala. Bull. 239.
On Juglans. February, 1855 (*Peters*).
New Jersey. Europe.

Polyporus arcularius (Batsch) Fr.

Ala. Bull. 239. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various fallen branches. Lee County, March, May, July, 1896 (*Underwood & Earle*); Tuscaloosa County, May, 1896 (*Underwood*); Madison County, May, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polyporus delicatus B. & C.
Grevillea, **1**:37. Ala. Bull. 241.
(*Peters.*)

Polyporus dibaphus B. & C.
Grevillea, **1**:36. Ala. Bull. 241.
On *Ilex opaca* (*Peters*).

Polyporus dichrous Fr.
Cornell Bull. 27.
On dead branches. Lee County, Auburn (*Atkinson*).
Ohio. Europe.

Polyporus distortus Schw.
Lee County, 1897 (*Earle & Baker*).
Ohio.

Polyporus earlii Underwood, Bull. Torr. Club, **24**:84. 1897.
Ala. Bull. 242.
On the ground. Lee County, November, 1896 (*Earle*).

Polyporus elegans (Bull.) Fr.
Ala. Bull. 242.
On fallen branches. Lee County, February, 1896 (*Underwood & Earle*); Hale County, May, 1896 (*Underwood*).
Ohio. Europe.

Polyporus ellisii Cooke.
Ala. Bull. 242, as *Polyporus flavo-squamosus* Underwood.
On clayey ground. Lee County, Auburn, November 23, 1896 (*Mrs. F. S. Earle*).

Polyporus endocrocinus Berk.
Ala. Bull. 242.
Hale County, May, 1896 (*Underwood*); Lee County, October, 1896 (*Baker*).

Polyporus flavovirens B. & Rav.
Ala. Bull. 243.
On clayey banks in woods. Lee County, July, 1896 (*Underwood & Earle*).
Ohio, New England.

Polyporus gilvus Schw.
Ala. Bull. 243. Cornell Bull. 27.
On trunks and logs. Lee County, Auburn (*Atkinson*); November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Common.

Polyporus hispidioides Peck.
Cornell Bull. 27.
In pine woods at base of trunks. Lee County, Auburn, August, 1890 (*Atkinson*)

Polyporus imbricatus (Bull.) Fr.
Cornell Bull. 27.
Lee County, Auburn, 1890 (*Atkinson*).
Europe.

Polyporus isidioides Berk. (?)
Ala. Bull. 243.
On trunks and branches. Lee County, December, 1895 (*Underwood*); January, March, 1896 (*Underwood & Earle*). Hale County, May, 1896 (*Underwood*). Winston County, June, 1896 (*Underwood*).

Polyporus irregularis Underwood, Bull. Torr. Club, **24**:85. 1897.
Ala. Bull. 243.
Under a pine log. Lee County, Auburn, February, 1896 (*Underwood*).

Polyporus marmoratus B & C.
Ala. Bull. 245, as *Polyporus plebeius* Berk.
On *Prunus serotina*. Lee County, April, May, 1896 (*Underwood & Earle*).
On Magnolia. Mobile County, December (*Earle*).
Louisiana.

Fomes curtisii Berk.

Ala. Bull. 241, under Polyporus. Cornell Bull. 27.
On dead stump. Lee County, Auburn, 1890 (*Atkinson*).
On Quercus, etc. Lee County, October, November, December, 1895 (*Underwood*); June, July, 1896 (*Underwood & Earle*).
Louisiana, New Jersey.

Fomes hemileucus B. & C.

Ala. Bull. 243, under Polyporus.
On Liriodendron. Lee County, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*).

Fomes lucidus (Leys.) Fr.

Ala. Bull. 244, under Polyporus.
On Tsuga. Winston County, June, 1896 (*Underwood*).
New Jersey, Ohio. Europe.

Fomes obliquus (Pers.) Fr.

Ala. Bull. 244, under Polyporus.
Lee County, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*).
Louisiana, Ohio. Europe.

Fomes reniformis Morgan.

Ala. Bull. 245, under Polyporus. Cornell Bull. 27.
On dead trunk. Lee County, Auburn, 1890 (*Atkinson*).
Lee County, March, 1896 (*Underwood & Earle*); Winston County, June, 1896 (*Underwood*).

Fomes rimosus Berk.

Ala. Bull. 246, under Polyporus.
On *Robinia pseudacacia*. Madison County, May, 1896 (*Underwood*); Dekalb County, May, 1896 (*Underwood*).
(*Atkinson.*)

Fomes scutellatus Schw.

Ala. Bull. 246, under Polyporus.
On branches of Alnus. January, 1896 (*Underwood & Earle*).

Fomes supinus Schw.

Ala. Bull. 247, under Polyporus.
On *Prunus angustifolia*. Lee County, November, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Not uncommon.

POLYPORUS Michx.

Polyporus acanthoides (Bull.) Fr.

Peters coll. No. 35. Ala. Bull. 239.
Lawrence County (*Peters*).

Polyporus adustus (Willd) Fr.

Ala. Bull. 239. Cornell Bull. 27.
On dead trunk. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks. Lee County, November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*).
On Hicoria. Lee County, December, 1896 (*Earle*).

Polyporus aneirinus Sommf.

Peters coll. Ala. Bull. 239.
On Juglans. February, 1855 (*Peters*).
New Jersey. Europe.

Polyporus arcularius (Batsch) Fr.

Ala. Bull. 239. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various fallen branches. Lee County, March, May, July, 1896 (*Underwood & Earle*); Tuscaloosa County, May, 1896 (*Underwood*); Madison County, May, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polyporus delicatus B. & C.
Grevillea, **1**:37. Ala. Bull. 241.
(*Peters.*)

Polyporus dibaphus B. & C.
Grevillea, **1**:36. Ala. Bull. 241.
On *Ilex opaca* (*Peters*).

Polyporus dichrous Fr.
Cornell Bull. 27.
On dead branches. Lee County, Auburn (*Atkinson*).
Ohio. Europe.

Polyporus distortus Schw.
Lee County, 1897 (*Earle & Baker*).
Ohio.

Polyporus earlii Underwood, Bull. Torr. Club, **24**:84. 1897.
Ala. Bull. 242.
On the ground. Lee County, November, 1896 (*Earle*).

Polyporus elegans (Bull.) Fr.
Ala. Bull. 242.
On fallen branches. Lee County, February, 1896 (*Underwood & Earle*); Hale County, May, 1896 (*Underwood*).
Ohio. Europe.

Polyporus ellisii Cooke.
Ala. Bull. 242, as *Polyporus flavo-squamosus* Underwood.
On clayey ground. Lee County, Auburn, November 23, 1896 (*Mrs. F. S. Earle*).

Polyporus endocrocinus Berk.
Ala. Bull. 242.
Hale County, May, 1896 (*Underwood*); Lee County, October, 1896 (*Baker*).

Polyporus flavovirens B. & Rav.
Ala. Bull. 243.
On clayey banks in woods. Lee County, July, 1896 (*Underwood & Earle*).
Ohio, New England.

Polyporus gilvus Schw.
Ala. Bull. 243. Cornell Bull. 27.
On trunks and logs. Lee County, Auburn (*Atkinson*); November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Common.

Polyporus hispidioides Peck.
Cornell Bull. 27.
In pine woods at base of trunks. Lee County, Auburn, August, 1890 (*Atkinson*)

Polyporus imbricatus (Bull.) Fr.
Cornell Bull. 27.
Lee County, Auburn, 1890 (*Atkinson*).
Europe.

Polyporus isidioides Berk. (?)
Ala. Bull. 243.
On trunks and branches. Lee County, December, 1895 (*Underwood*); January, March, 1896 (*Underwood & Earle*). Hale County, May, 1896 (*Underwood*). Winston County, June, 1896 (*Underwood*).

Polyporus irregularis Underwood, Bull. Torr. Club, **24**:85. 1897.
Ala. Bull. 243.
Under a pine log. Lee County, Auburn, February, 1896 (*Underwood*).

Polyporus marmoratus B & C.
Ala. Bull. 245, as *Polyporus plebeius* Berk.
On *Prunus serotina*. Lee County, April, May, 1896 (*Underwood & Earle*).
On Magnolia. Mobile County, December (*Earle*).
Louisiana.

Fomes curtisii Berk.

Ala. Bull. 241, under Polyporus. Cornell Bull. 27.
On dead stump. Lee County, Auburn, 1890 (*Atkinson*).
On Quercus, etc. Lee County, October, November, December, 1895 (*Underwood*); June, July, 1896 (*Underwood & Earle*).
Louisiana, New Jersey.

Fomes hemileucus B. & C.

Ala. Bull. 243, under Polyporus.
On Liriodendron. Lee County, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*).

Fomes lucidus (Leys.) Fr.

Ala. Bull. 244, under Polyporus.
On Tsuga. Winston County, June, 1896 (*Underwood*).
New Jersey, Ohio. Europe.

Fomes obliquus (Pers.) Fr.

Ala. Bull. 244, under Polyporus.
Lee County, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*).
Louisiana, Ohio. Europe.

Fomes reniformis Morgan.

Ala. Bull. 245, under Polyporus. Cornell Bull. 27.
On dead trunk. Lee County, Auburn, 1890 (*Atkinson*).
Lee County, March, 1896 (*Underwood & Earle*); Winston County, June, 1896 (*Underwood*).

Fomes rimosus Berk.

Ala. Bull. 246, under Polyporus.
On *Robinia pseudacacia*. Madison County, May, 1896 (*Underwood*); Dekalb County, May, 1896 (*Underwood*).
(*Atkinson.*)

Fomes scutellatus Schw.

Ala. Bull. 246, under Polyporus.
On branches of Alnus. January, 1896 (*Underwood & Earle*).

Fomes supinus Schw.

Ala. Bull. 247, under Polyporus.
On *Prunus angustifolia*. Lee County, November, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Not uncommon.

POLYPORUS Michx.

Polyporus acanthoides (Bull.) Fr.

Peters coll. No. 35. Ala. Bull. 239.
Lawrence County (*Peters*).

Polyporus adustus (Willd) Fr.

Ala. Bull. 239. Cornell Bull. 27.
On dead trunk. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks. Lee County, November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*).
On Hicoria. Lee County, December, 1896 (*Earle*).

Polyporus aneirinus Sommf.

Peters coll. Ala. Bull. 239.
On Juglans. Febrnary, 1855 (*Peters*).
New Jersey. Europe.

Polyporus arcularius (Batsch) Fr.

Ala. Bull. 239. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various fallen branches. Lee County, March, May, July, 1896 (*Underwood & Earle*); Tuscaloosa County, May, 1896 (*Underwood*); Madison County, May, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polyporus delicatus B. & C.
Grevillea, **1**:37. Ala. Bull. 241.
(*Peters.*)

Polyporus dibaphus B. & C.
Grevillea, **1**:36. Ala. Bull. 241.
On *Ilex opaca* (*Peters*).

Polyporus dichrous Fr.
Cornell Bull. 27.
On dead branches. Lee County, Auburn (*Atkinson*).
Ohio. Europe.

Polyporus distortus Schw.
Lee County, 1897 (*Earle & Baker*).
Ohio.

Polyporus earlii Underwood, Bull. Torr. Club, **24**:84. 1897.
Ala. Bull. 242.
On the ground. Lee County, November, 1896 (*Earle*).

Polyporus elegans (Bull.) Fr.
Ala. Bull. 242.
On fallen branches. Lee County, February, 1896 (*Underwood & Earle*); Hale County, May, 1896 (*Underwood*).
Ohio. Europe.

Polyporus ellisii Cooke.
Ala. Bull. 242, as *Polyporus flavo-squamosus* Underwood.
On clayey ground. Lee County, Auburn, November 23, 1896 (*Mrs. F. S. Earle*).

Polyporus endocrocinus Berk.
Ala. Bull. 242.
Hale County, May, 1896 (*Underwood*); Lee County, October, 1896 (*Baker*).

Polyporus flavovirens B. & Rav.
Ala. Bull. 243.
On clayey banks in woods. Lee County, July, 1896 (*Underwood & Earle*).
Ohio, New England.

Polyporus gilvus Schw.
Ala. Bull. 243. Cornell Bull. 27.
On trunks and logs. Lee County, Auburn (*Atkinson*); November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Common.

Polyporus hispidioides Peck.
Cornell Bull. 27.
In pine woods at base of trunks. Lee County, Auburn, August, 1890 (*Atkinson*)

Polyporus imbricatus (Bull.) Fr.
Cornell Bull. 27.
Lee County, Auburn, 1890 (*Atkinson*).
Europe.

Polyporus isidioides Berk. (?)
Ala. Bull. 243.
On trunks and branches. Lee County, December, 1895 (*Underwood*); January, March, 1896 (*Underwood & Earle*). Hale County, May, 1896 (*Underwood*). Winston County, June, 1896 (*Underwood*).

Polyporus irregularis Underwood, Bull. Torr. Club, **24**:85. 1897.
Ala. Bull. 243.
Under a pine log. Lee County, Auburn, February, 1896 (*Underwood*).

Polyporus marmoratus B & C.
Ala. Bull. 245, as *Polyporus plebeius* Berk.
On *Prunus serotina*. Lee County, April, May, 1896 (*Underwood & Earle*).
On Magnolia. Mobile County, December (*Earle*).
Louisiana.

Polyporus meliae Underwood, Bull. Torr. Club, **24**:85. 1897.
Ala. Bull. 244.
On branches of *Melia azedarach*. Lee County, October 15, 1895 (*Underwood*).

Polyporus obtusus Berk.
Ala. Bull. 244.
On *Quercus texana*. Lee County, November, 1895 (*Underwood*). Rare.
New Jersey.

Polyporus picipes Morgan.
Ala. Bull. 245.
(*Atkinson.*)
New Jersey, Ohio.

Polyporus poripes Fr.
Ala. Bull 245.
Lee County, November, 1895 (*Underwood*).
New Jersey.

Polyporus retipes Underwood, Bull. Torr. Club, **24**:85. 1897
Ala. Bull. 245.
In pine woods. Lee County, Auburn, December, 1896 (*Mrs. F. S. Earle*).

Polyporus resinosus (Schw.) Fr.
Ala. Bull. 246.
On a fallen trunk. Lee County, March, 1896 (*Underwood & Earle*).
Ohio. Europe.

Polyporus schweinitzii Fr.
Ala. Bull. 246.
On the ground. Lee County, October, 1896 (*Burton*); November, December, 1896 (*Earle*).
South Carolina, New Jersey.

Polyporus sulphureus (Bull.) Fr.
Ala. Bull. 247.
Winston County, June, 1896 (*Underwood*).
(*Atkinson.*)
Louisiana, Ohio, New Jersey. Europe.

Polyporus varius Fr.
Cornell Bull. 27.
On roots of tree stump. Macon County, Shorter, July 16, 1890 (*Atkinson*).
Ohio. Europe.

Polyporus xanthus Fr.
Ala. Bull. 247.
On oak (*Peters*).
South Carolina, New Jersey.

POLYSTICTUS Fr. (Polyporus, Ala. Bull.).

Polystictus abietinus Fr.
Ala. Bull. 239.
On Pinus. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Common.
Louisiana, New Jersey, Nebraska. Europe.

Polystictus barbatulus Fr.
Ala. Bull. 239. Cornell Bull. 27.
On branches of *Pinus palustris*. Lee County, Auburn, February 22, 1891 (*Atkinson*); Lee County, November, 1895 (*Underwood*).

Polystictus biformis Klotzsch.
Ala. Bull. 240. Cornell Bull. 27.
(*Beaumont.*)
On dead trunks. Lee County, Auburn (*Atkinson*).

Polystictus cervinus Schw.
Ala. Bull. 240.

Polystictus cinnabarinus (Jacq.) Fr.

Ala. Bull. 240. Cornell Bull. 27.
On dead trunks. Lee County, Auburn, 1890 (*Atkinson*).
On Prunus. Lee County, 1895; Winston County, June, 1896 (*Underwood*); Lee County, November, 1896 (*Earle*).

Polystictus crocatus Fr.

Cornell Bull. 27.
On trunks. Macon County, Shorter, July 16, 1890 (*Atkinson*).
South Carolina.

Polystictus dealbatus B. & C.

Peters coll. No. 40. Rav. Fung. Car. Exsic. **3**:10. Ala. Bull. 241.
July, September, 1864 (*Peters, Beaumont*).

Polystictus hirsutus (Wulf.) Fr.

Ala. Bull. 243. Cornell Bull. 27.
On dead branches. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On trunks and branches. Lee County, December, 1895 (*Underwood*); March, April, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*); March, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Very common.
Louisiana, Ohio, New Jersey. Europe.

Polystictus ilicincola B. & C.

Rav. Fung. Car. Exsic. **5**:17. Grevillea, **1**:52, under Polyporus. Ala. Bull. 243.
On *Ilex opaca* (*Peters*).

Polystictus occidentalis (Fr.) Klotzsch.

Ala. Bull. 245.
(*Beaumont.*)

Polystictus molliusculus Berk.

On old stumps. Lee County, January, 1897 (*Earle & Baker*).
Ohio.

Polystictus mutabilis B. & C.

On oak stumps. Lee County, January, 1897 (*Earle & Baker*).
Louisiana, South Carolina.

Polystictus parvulus Klotzsch.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

Polystictus pergamenus Fr.

Ala. Bull. 245. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks of deciduous trees. Lee County, October, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Mobile County, December, 1895 (*Earle*). Winston County, June, 1896 (*Underwood*).

Polystictus perennis (L.) Fr.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Polystictus sanguineus (L.) Morgan.

Ala. Bull. 246.
On fallen trunks. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Tuscaloosa County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*).

Polystictus splendens Peck.

Peters coll. No. 37, as *Polyporus perennis*. Ala. Bull. 246.
August, 1864 (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).

Polystictus velutinus Fr.

Ala. Bull. 247.
Lee County, October, December, 1895 (*Underwood*); January, June, July, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polyporus meliae Underwood, Bull. Torr. Club, **24**: 85. 1897.
Ala. Bull. 244.
On branches of *Melia azedarach*. Lee County, October 15, 1895 (*Underwood*).

Polyporus obtusus Berk.
Ala. Bull. 244.
On *Quercus texana*. Lee County, November, 1895 (*Underwood*). Rare.
New Jersey.

Polyporus picipes Morgan.
Ala. Bull. 245.
(*Atkinson.*)
New Jersey, Ohio.

Polyporus poripes Fr.
Ala. Bull 245.
Lee County, November, 1895 (*Underwood*).
New Jersey.

Polyporus retipes Underwood, Bull. Torr. Club, **24**: 85. 1897
Ala. Bull. 245.
In pine woods. Lee County, Auburn, December, 1896 (*Mrs. F. S. Earle*).

Polyporus resinosus (Schw.) Fr.
Ala. Bull. 246.
On a fallen trunk. Lee County, March, 1896 (*Underwood & Earle*).
Ohio. Europe.

Polyporus schweinitzii Fr.
Ala. Bull. 246.
On the ground. Lee County, October, 1896 (*Burton*); November, December, 1896 (*Earle*).
South Carolina, New Jersey.

Polyporus sulphureus (Bull.) Fr.
Ala. Bull. 247.
Winston County, June, 1896 (*Underwood*).
(*Atkinson.*)
Louisiana, Ohio, New Jersey. Europe.

Polyporus varius Fr.
Cornell Bull. 27.
On roots of tree stump. Macon County, Shorter, July 16, 1890 (*Atkinson*).
Ohio. Europe.

Polyporus xanthus Fr.
Ala. Bull. 247.
On oak (*Peters*).
South Carolina, New Jersey.

POLYSTICTUS Fr. (Polyporus, Ala. Bull.).

Polystictus abietinus Fr.
Ala. Bull. 239.
On Pinus. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Common.
Louisiana, New Jersey, Nebraska. Europe.

Polystictus barbatulus Fr.
Ala. Bull. 239. Cornell Bull. 27.
On branches of *Pinus palustris*. Lee County, Auburn, February 22, 1891 (*Atkinson*); Lee County, November, 1895 (*Underwood*).

Polystictus biformis Klotzsch.
Ala. Bull. 240. Cornell Bull. 27.
(*Beaumont.*)
On dead trunks. Lee County, Auburn (*Atkinson*).

Polystictus cervinus Schw.
Ala. Bull. 240.

Polystictus cinnabarinus (Jacq.) Fr.

Ala. Bull. 240. Cornell Bull. 27.
On dead trunks. Lee County, Auburn, 1890 (*Atkinson*).
On Prunus. Lee County, 1895; Winston County, June, 1896 (*Underwood*); Lee County, November, 1896 (*Earle*).

Polystictus crocatus Fr.

Cornell Bull. 27.
On trunks. Macon County, Shorter, July 16, 1890 (*Atkinson*).
South Carolina.

Polystictus dealbatus B. & C.

Peters coll. No. 40. Rav. Fung. Car. Exsic. **3**:10. Ala. Bull. 241.
July, September, 1864 (*Peters, Beaumont*).

Polystictus hirsutus (Wulf.) Fr.

Ala. Bull. 243. Cornell Bull. 27.
On dead branches. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On trunks and branches. Lee County, December, 1895 (*Underwood*); March, April, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*); March, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Very common.
Louisiana, Ohio, New Jersey. Europe.

Polystictus ilicincola B. & C.

Rav. Fung. Car. Exsic. **5**:17. Grevillea, **1**:52, under Polyporus. Ala. Bull. 243.
On *Ilex opaca* (*Peters*).

Polystictus occidentalis (Fr.) Klotzsch.

Ala. Bull. 245.
(*Beaumont.*)

Polystictus molliusculus Berk.

On old stumps. Lee County, January, 1897 (*Earle & Baker*).
Ohio.

Polystictus mutabilis B. & C.

On oak stumps. Lee County, January, 1897 (*Earle & Baker*).
Louisiana, South Carolina.

Polystictus parvulus Klotzsch.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

Polystictus pergamenus Fr.

Ala. Bull. 245. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks of deciduous trees. Lee County, October, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Mobile County, December, 1895 (*Earle*). Winston County, June, 1896 (*Underwood*).

Polystictus perennis (L.) Fr.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Polystictus sanguineus (L.) Morgan.

Ala. Bull. 246.
On fallen trunks. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Tuscaloosa County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*).

Polystictus splendens Peck.

Peters coll. No. 37, as *Polyporus perennis*. Ala. Bull. 246.
August, 1864 (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).

Polystictus velutinus Fr.

Ala. Bull. 247.
Lee County, October, December, 1895 (*Underwood*); January, June, July, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polyporus meliae Underwood, Bull. Torr. Club, **24**:85. 1897.
Ala. Bull. 244.
On branches of *Melia azedarach*. Lee County, October 15, 1895 (*Underwood*).

Polyporus obtusus Berk.
Ala. Bull. 244.
On *Quercus texana*. Lee County, November, 1895 (*Underwood*). Rare.
New Jersey.

Polyporus picipes Morgan.
Ala. Bull. 245.
(*Atkinson.*)
New Jersey, Ohio.

Polyporus poripes Fr.
Ala. Bull 245.
Lee County, November, 1895 (*Underwood*).
New Jersey.

Polyporus retipes Underwood, Bull. Torr. Club, **24**:85. 1897
Ala. Bull. 245.
In pine woods. Lee County, Auburn, December, 1896 (*Mrs. F. S. Earle*).

Polyporus resinosus (Schw.) Fr.
Ala. Bull. 246.
On a fallen trunk. Lee County, March, 1896 (*Underwood & Earle*).
Ohio. Europe.

Polyporus schweinitzii Fr.
Ala. Bull. 246.
On the ground. Lee County, October, 1896 (*Burton*); November, December, 1896 (*Earle*).
South Carolina, New Jersey.

Polyporus sulphureus (Bull.) Fr.
Ala. Bull. 247.
Winston County, June, 1896 (*Underwood*).
(*Atkinson.*)
Louisiana, Ohio, New Jersey. Europe.

Polyporus varius Fr.
Cornell Bull. 27.
On roots of tree stump. Macon County, Shorter, July 16, 1890 (*Atkinson*).
Ohio. Europe.

Polyporus xanthus Fr.
Ala. Bull. 247.
On oak (*Peters*).
South Carolina, New Jersey.

POLYSTICTUS Fr. (Polyporus, Ala. Bull.).

Polystictus abietinus Fr.
Ala. Bull. 239.
On Pinus. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Common.
Louisiana, New Jersey, Nebraska. Europe.

Polystictus barbatulus Fr.
Ala. Bull. 239. Cornell Bull. 27.
On branches of *Pinus palustris*. Lee County, Auburn, February 22, 1891 (*Atkinson*); Lee County, November, 1895 (*Underwood*).

Polystictus biformis Klotzsch.
Ala. Bull. 240. Cornell Bull. 27.
(*Beaumont.*)
On dead trunks. Lee County, Auburn (*Atkinson*).

Polystictus cervinus Schw.
Ala. Bull. 240.

Polystictus cinnabarinus (Jacq.) Fr.

Ala. Bull. 240. Cornell Bull. 27.
On dead trunks. Lee County, Auburn, 1890 (*Atkinson*).
On Prunus. Lee County, 1895; Winston County, June, 1896 (*Underwood*); Lee County, November, 1896 (*Earle*).

Polystictus crocatus Fr.

Cornell Bull. 27.
On trunks. Macon County, Shorter, July 16, 1890 (*Atkinson*).
South Carolina.

Polystictus dealbatus B. & C.

Peters coll. No. 40. Rav. Fung. Car. Exsic. **3**:10. Ala. Bull. 241.
July, September, 1864 (*Peters, Beaumont*).

Polystictus hirsutus (Wulf.) Fr.

Ala. Bull. 243. Cornell Bull. 27.
On dead branches. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On trunks and branches. Lee County, December, 1895 (*Underwood*); March, April, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*); March, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Very common.
Louisiana, Ohio, New Jersey. Europe.

Polystictus ilicincola B. & C.

Rav. Fung. Car. Exsic. **5**:17. Grevillea, **1**:52, under Polyporus. Ala. Bull. 243.
On *Ilex opaca* (*Peters*).

Polystictus occidentalis (Fr.) Klotzsch.

Ala. Bull. 245.
(*Beaumont.*)

Polystictus molliusculus Berk.

On old stumps. Lee County, January, 1897 (*Earle & Baker*).
Ohio.

Polystictus mutabilis B. & C.

On oak stumps. Lee County, January, 1897 (*Earle & Baker*).
Louisiana, South Carolina.

Polystictus parvulus Klotzsch.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

Polystictus pergamenus Fr.

Ala. Bull. 245. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks of deciduous trees. Lee County, October, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Mobile County, December, 1895 (*Earle*). Winston County, June, 1896 (*Underwood*).

Polystictus perennis (L.) Fr.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Polystictus sanguineus (L.) Morgan.

Ala. Bull. 246.
On fallen trunks. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Tuscaloosa County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*).

Polystictus splendens Peck.

Peters coll. No. 37, as *Polyporus perennis*. Ala. Bull. 246.
August, 1864 (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).

Polystictus velutinus Fr.

Ala. Bull. 247.
Lee County, October, December, 1895 (*Underwood*); January, June, July, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polyporus meliae Underwood, Bull. Torr. Club, **24**: 85. 1897.
Ala. Bull. 244.
On branches of *Melia azedarach*. Lee County, October 15, 1895 (*Underwood*).

Polyporus obtusus Berk.
Ala. Bull. 244.
On *Quercus texana*. Lee County, November, 1895 (*Underwood*). Rare.
New Jersey.

Polyporus picipes Morgan.
Ala. Bull. 245.
(*Atkinson.*)
New Jersey, Ohio.

Polyporus poripes Fr.
Ala. Bull 245.
Lee County, November, 1895 (*Underwood*).
New Jersey.

Polyporus retipes Underwood, Bull. Torr. Club, **24**: 85. 1897
Ala. Bull. 245.
In pine woods. Lee County, Auburn, December, 1896 (*Mrs. F. S. Earle*).

Polyporus resinosus (Schw.) Fr.
Ala. Bull. 246.
On a fallen trunk. Lee County, March, 1896 (*Underwood & Earle*).
Ohio. Europe.

Polyporus schweinitzii Fr.
Ala. Bull. 246.
On the ground. Lee County, October, 1896 (*Burton*); November, December, 1896 (*Earle*).
South Carolina, New Jersey.

Polyporus sulphureus (Bull.) Fr.
Ala. Bull. 247.
Winston County, June, 1896 (*Underwood*).
(*Atkinson.*)
Louisiana, Ohio, New Jersey. Europe.

Polyporus varius Fr.
Cornell Bull. 27.
On roots of tree stump. Macon County, Shorter, July 16, 1890 (*Atkinson*).
Ohio. Europe.

Polyporus xanthus Fr.
Ala. Bull. 247.
On oak (*Peters*).
South Carolina, New Jersey.

POLYSTICTUS Fr. (Polyporus, Ala. Bull.).

Polystictus abietinus Fr.
Ala. Bull. 239.
On Pinus. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Common.
Louisiana, New Jersey, Nebraska. Europe.

Polystictus barbatulus Fr.
Ala. Bull. 239. Cornell Bull. 27.
On branches of *Pinus palustris*. Lee County, Auburn, February 22, 1891 (*Atkinson*); Lee County, November, 1895 (*Underwood*).

Polystictus biformis Klotzsch.
Ala. Bull. 240. Cornell Bull. 27.
(*Beaumont.*)
On dead trunks. Lee County, Auburn (*Atkinson*).

Polystictus cervinus Schw.
Ala. Bull. 240.

Polystictus cinnabarinus (Jacq.) Fr.

Ala. Bull. 240. Cornell Bull. 27.
On dead trunks. Lee County, Auburn, 1890 (*Atkinson*).
On Prunus. Lee County, 1895; Winston County, June, 1896 (*Underwood*); Lee County, November, 1896 (*Earle*).

Polystictus crocatus Fr.

Cornell Bull. 27.
On trunks. Macon County, Shorter, July 16, 1890 (*Atkinson*).
South Carolina.

Polystictus dealbatus B. & C.

Peters coll. No. 40. Rav. Fung. Car. Exsic. **3**:10. Ala. Bull. 241.
July, September, 1864 (*Peters, Beaumont*).

Polystictus hirsutus (Wulf.) Fr.

Ala. Bull. 243. Cornell Bull. 27.
On dead branches. Lee County, Auburn, February 22, 1891 (*Atkinson*).
On trunks and branches. Lee County, December, 1895 (*Underwood*); March, April, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*); March, 1896 (*Earle*). Hale County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*). Very common.
Louisiana, Ohio, New Jersey. Europe.

Polystictus ilicincola B. & C.

Rav. Fung. Car. Exsic. **5**:17. Grevillea, **1**:52, under Polyporus. Ala. Bull. 243.
On *Ilex opaca* (*Peters*).

Polystictus occidentalis (Fr.) Klotzsch.

Ala. Bull. 245.
(*Beaumont.*)

Polystictus molliusculus Berk.

On old stumps. Lee County, January, 1897 (*Earle & Baker*).
Ohio.

Polystictus mutabilis B. & C.

On oak stumps. Lee County, January, 1897 (*Earle & Baker*).
Louisiana, South Carolina.

Polystictus parvulus Klotzsch.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

Polystictus pergamenus Fr.

Ala. Bull. 245. Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).
On various trunks of deciduous trees. Lee County, October, December, 1895 (*Underwood*); January, February, 1896 (*Underwood & Earle*); December, 1896 (*Earle*). Mobile County, December, 1895 (*Earle*). Winston County, June, 1896 (*Underwood*).

Polystictus perennis (L.) Fr.

Ala. Bull. 245.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Polystictus sanguineus (L.) Morgan.

Ala. Bull. 246.
On fallen trunks. Lee County, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Tuscaloosa County, May, 1896 (*Underwood*); Winston County, June, 1896 (*Underwood*).

Polystictus splendens Peck.

Peters coll. No. 37, as *Polyporus perennis*. Ala. Bull. 246.
August, 1864 (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).

Polystictus velutinus Fr.

Ala. Bull. 247.
Lee County, October, December, 1895 (*Underwood*); January, June, July, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Polystictus versicolor (L.) Fr.

Ala. Bull. 247.
On various deciduous trees. Lee County, October, November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Winston County, June, December, 1896 (*Underwood*).

Polystictus virgineus Schw.

Rav. Fung. Car. Exsic. 3:11. Ala. Bull. 247.
(*Peters.*)
Ohio.

TRAMETES Fr.

Trametes lactea Fr.

Peters coll. No. 41. Ala. Bull. 248.
Northern Alabama (*Peters*).
Louisiana, New Jersey.

Trametes petersii B. & C.

Grevillea, 1:66. Ala. Bull. 248.
(*Peters.*)

Trametes rigida B. & Mont.

Ala. Bull. 248.
(*Beaumont.*) Lee County, November, 1895 (*Underwood*).
Louisiana, South Carolina.

Trametes sepium Berk.

Ala. Bull. 248.
On *Sassafras sassafras* (*Peters, Beaumont*).
Lee County, November, 1895 (*Underwood*); January, July, 1896 (*Underwood & Earle*).
Louisiana, South Carolina, North Carolina, Connecticut.

DAEDALEA Pers.

Daedalea ambigua Berk.

Ala. Bull. 237.
On Quercus. Lee County, April, 1896 (*Underwood & Earle*).
Louisiana. Ohio.

Daedalea confragosa (Bolt.) Pers.

Ala. Bull. 237.
On Salix. Lee County, December, 1895 (*Underwood*); February, March, 1896 (*Underwood & Earle*); October 1896 (*Baker*); November, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Daedalea confragosa lenzitoides Peck.

Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).

Daedalea glaberrima B. & C.

Ala. Bull. 237.
Lee County, December, 1895 (*Underwood*).
South Carolina.

Daedalea unicolor (Bull.) Fr.

Peters coll. No. 44, as *D. cinerea*. Ala. Bull. 237.
(*Beaumont.*)
New Jersey, Ohio. Europe.

LENZITES Fr.

Lenzites berkelei Lév.

Ala. Bull. 238. Cornell Bull. 26.
(*Beaumont.*) Lee County, Auburn (*Atkinson*).
South Carolina.

Lenzites betulina (L.) Fr.

Ala. Bull. 238. Cornell Bull. 26.
On dead trunks. Lee County, Auburn, February 22, 1891 (*Atkinson*).
Lee County, October, December, 1895 (*Underwood*); November, 1896 (*Earle*).
Louisiana, New Jersey, Ohio. Europe.

Lenzites cookei Berk.
Cornell Bull. 26.
Lee County, Auburn, autumn, 1890 (*Atkinson*).

Lenzites corrugata Klotzsch.
Ala. Bull. 237.
Lee County, January, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, New England.

Lenzites crataegi Berk.
Ala. Bull. 238.
(*Peters.*)
South Carolina, North Carolina, Ohio, Pennsylvania, New Jersey.

Lenzites klotzschii Berk.
Ala. Bull. 238.
On Liquidambar. Lee County, October, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Very common.
South Carolina, North Carolina, New England.

Lenzites repanda Fr.
Ala. Bull. 238.
(*Peters.*)

Lenzites rhabarbarina B. & C.
Ala. Bull. 238.
On Pinus. Lee County, October, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*).
South Carolina.

Lenzites sepiaria Fr.
Ala. Bull. 238.
On Pinus. Lee County, January, 1896 (*Underwood & Earle*). Hale County, May, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

GLOEOPORUS Mont.

Gloeoporus conchoides Mont.
Peters coll. as *Polyporus nigropurpurascens.* Ala. Bull. 237.
(*Peters.*) Lee County, November, December, 1895 (*Underwood*); January, July, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*). Hale County, May, 1896 (*Underwood*). Common.
West Indies, South America, South Africa.

FAVOLUS Fr.

Favolus alveolarius (DC.) Fairm.
Peters coll. No. 48. Ala. Bull. 237.
On Fagus. Lawrence County, 1863 (*Peters*).
Lee County, March, 1896 (*Underwood & Earle*).
Europe.

Favolus rhipidium (Berk.) Fr.
Ala. Bull. 246, under Polyporus.
Etowah County, May, 1896 (*Underwood*). Rare.

Favolus tesselatus Mont.
Cornell Bull. 27.
On dead branches of Acer. Lee County, Auburn, 1891 (*Atkinson*).

Tribe FISTULINEAE.

POROTHELIUM Fr.

Porothelium fimbriatum (Pers.) Fr.
Peters coll. No. 52. Ala. Bull. 247.
On Betula. Winston County, 1861 (*Peters*).
Ohio. Europe.

Polystictus versicolor (L.) Fr.

Ala. Bull. 247.
On various deciduous trees. Lee County, October, November, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*). Winston County, June, December, 1896 (*Underwood*).

Polystictus virgineus Schw.

Rav. Fung. Car. Exsic. **3**:11. Ala. Bull. 247.
(*Peters.*)
Ohio.

TRAMETES Fr.

Trametes lactea Fr.

Peters coll. No. 41. Ala. Bull. 248.
Northern Alabama (*Peters*).
Louisiana, New Jersey.

Trametes petersii B. & C.

Grevillea, **1**:66. Ala. Bull. 248.
(*Peters.*)

Trametes rigida B. & Mont.

Ala. Bull. 248.
(*Beaumont.*) Lee County, November, 1895 (*Underwood*).
Louisiana, South Carolina.

Trametes sepium Berk.

Ala. Bull. 248.
On *Sassafras sassafras* (*Peters, Beaumont*).
Lee County, November, 1895 (*Underwood*); January, July, 1896 (*Underwood & Earle*).
Louisiana, South Carolina, North Carolina, Connecticut.

DAEDALEA Pers.

Daedalea ambigua Berk.

Ala. Bull. 237.
On Quercus. Lee County, April, 1896 (*Underwood & Earle*).
Louisiana. Ohio.

Daedalea confragosa (Bolt.) Pers.

Ala. Bull. 237.
On Salix. Lee County, December, 1895 (*Underwood*); February, March, 1896 (*Underwood & Earle*); October 1896 (*Baker*); November, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Daedalea confragosa lenzitoides Peck.

Cornell Bull. 27.
On dead branches. Lee County, Auburn, 1890 (*Atkinson*).

Daedalea glaberrima B. & C.

Ala. Bull. 237.
Lee County, December, 1895 (*Underwood*).
South Carolina.

Daedalea unicolor (Bull.) Fr.

Peters coll. No. 44, as *D. cinerea*. Ala. Bull. 237.
(*Beaumont.*)
New Jersey, Ohio. Europe.

LENZITES Fr.

Lenzites berkelei Lév.

Ala. Bull. 238. Cornell Bull. 26.
(*Beaumont.*) Lee County, Auburn (*Atkinson*).
South Carolina.

Lenzites betulina (L.) Fr.

Ala. Bull. 238. Cornell Bull. 26.
On dead trunks. Lee County, Auburn, February 22, 1891 (*Atkinson*).
Lee County, October, December, 1895 (*Underwood*); November, 1896 (*Earle*).
Louisiana, New Jersey, Ohio. Europe.

Lenzites cookei Berk.
Cornell Bull. 26.
Lee County, Auburn, autumn, 1890 (*Atkinson*).

Lenzites corrugata Klotzsch.
Ala. Bull. 237.
Lee County, January, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, New England.

Lenzites crataegi Berk.
Ala. Bull. 238.
(*Peters.*)
South Carolina, North Carolina, Ohio, Pennsylvania, New Jersey.

Lenzites klotzschii Berk.
Ala. Bull. 238.
On Liquidambar. Lee County, October, November, December, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*). Very common.
South Carolina, North Carolina, New England.

Lenzites repanda Fr.
Ala. Bull. 238.
(*Peters.*)

Lenzites rhabarbarina B. & C.
Ala. Bull. 238.
On Pinus. Lee County, October, 1895 (*Underwood*); January, 1896 (*Underwood & Earle*).
South Carolina.

Lenzites sepiaria Fr.
Ala. Bull. 238.
On Pinus. Lee County, January, 1896 (*Underwood & Earle*). Hale County, May, 1896 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

GLOEOPORUS Mont.

Gloeoporus conchoides Mont.
Peters coll. as *Polyporus nigropurpurascens*. Ala. Bull. 237.
(*Peters.*) Lee County, November, December, 1895 (*Underwood*); January, July, 1896 (*Underwood & Earle*). Mobile County, December, 1895 (*Earle*). Hale County, May, 1896 (*Underwood*). Common.
West Indies, South America, South Africa.

FAVOLUS Fr.

Favolus alveolarius (DC.) Fairm.
Peters coll. No. 48. Ala. Bull. 237.
On Fagus. Lawrence County, 1863 (*Peters*).
Lee County, March, 1896 (*Underwood & Earle*).
Europe.

Favolus rhipidium (Berk.) Fr.
Ala. Bull. 246, under Polyporus.
Etowah County, May, 1896 (*Underwood*). Rare.

Favolus tesselatus Mont.
Cornell Bull. 27.
On dead branches of Acer. Lee County, Auburn, 1891 (*Atkinson*).

Tribe FISTULINEAE.

POROTHELIUM Fr.

Porothelium fimbriatum (Pers.) Fr.
Peters coll. No. 52. Ala. Bull. 247.
On Betula. Winston County, 1861 (*Peters*).
Ohio. Europe.

FISTULINA Bull.

Fistulina pallida B. & Rav.

Grevillea, 1:71. Ala. Bull. 252.
On base of white oak stump. Northern Alabama (*Peters*).
South Carolina.

Fistulina radicata Schw.

Peters coll. No. 24. Ala. Bull. 252.
At roots of old chestnut stump. Northern Alabama, September, 1868 (*Peters*).

Fistulina spathulata B. & C.

Grevillea, 1:71. Ala. Bull. 252.
At the base of an oak. Winston County (*Peters*).

Tribe BOLETINEAE.

BOLETUS L.

Boletus albus Peck.

Cornell Bull. 26.
Lee County, Auburn, August, 1890 (*Atkinson*).

Boletus affinis Peck.

Cornell Bull. 27.
Lee County, Auburn, summer, 1890 (*Atkinson*).

Boletus auriporus Peck.

Ala. Bull. 248.
Lee County, July, 1896 (*Underwood & Earle*).
Ohio.

Boletus brevipes Peck.

Ala. Bull. 248. Cornell Bull. 27.
On sandy soil, under pines. Lee County, Auburn, December 20, 1891 (*Atkinson*).
Lee County, November, 1895 (*Underwood*); October, November, 1896 (*Baker*).

Boletus chromapes Frost.

Ala. Bull. 248.
Lee County, May, 1896 (*Underwood & Earle*).
Northern States (?).

Boletus chrysenteron Fr.

Cornell Bull. 27.
In open woods, on the ground. Lee County, Auburn, summer, 1890 (*Atkinson*).
Ohio. Europe.

Boletus edulis Bull.

Ala. Bull. 248. Cornell Bull. 26.
Woods, on the ground. Lee County, Auburn, August, 1890 (*Atkinson*); July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

Boletus felleus Bull.

Ala. Bull. 248.
Lee County, July, 1896 (*Underwood & Earle*); October, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Boletus ferrugineus Frost, var.

Ala. Bull. 248.
Lee County, July, 1896 (*Underwood & Earle*).

Boletus fistulosus Peck, Bull. Torr. Club, **24**:144. 1897.

Ala. Bull. 249.
Grassy woods. Lee County, Auburn, July, 1896 (*Underwood*).

Boletus fraternus Peck, Bull. Torr. Club, **24**:145. 1897.

Ala. Bull. 249.
Shaded streets. Lee County, Auburn, July, 1896 (*Underwood & Earle*).

Boletus frustulosus Peck, Bull. Torr. Club, **24**: 146. 1897.
Ala. Bull. 250.
On clayey banks along roadsides. Hale County, Akron, July, 1896 (*Underwood*).

Boletus gracilis laevipes Peck.
Open woods. Lee County, July, 1897 (*Earle*).
Ohio.

Boletus granulatus L.
Ala. Bull. 250. Cornell Bull. 27.
Pine woods, on the ground. Lee County, Auburn, July, 1890 (*Atkinson*); October, 1896 (*Earle*).
New Jersey. Europe.

Boletus griseus Frost.
Ala. Bull. 250. Cornell Bull. 26.
Lee County, Auburn, summer, 1890 (*Atkinson*); July, 1896 (*Underwood & Earle*).

Boletus hemichrysus B. & C.
Cornell Bull. 26.
Open woods, at base of a stump. Lee County, Auburn, July, 1890 (*Atkinson*.
South Carolina.

Boletus hirtellus Peck.
Ala. Bull. 250.
Pine woods. Lee County, October, 1896 (*Earle*).

Boletus leptocephalus Peck.
Dry open woods. Lee County, July, 1897 (*Earle & Baker*).

Boletus morgani Peck.
Ala. Bull. 250.
Lee County, October, 1896 (*Baker*).

Boletus ornatipes B. & C.
Ala. Bull. 250.
Lee County, July, 1896 (*Underwood & Earle*).

Boletus pallidus Frost.
Ala. Bull. 250. Cornell Bull. 27.
Woods, on the ground. Lee County, Auburn, July, 1890 (*Atkinson*); October, 1896 (*Earle*).

Boletus parvus Frost.
Ala. Bull. 250.
Lee County, July, 1896 (*Underwood & Earle*).

Boletus retipes B. & C.
Ala. Bull. 251.
Lee County, July, 1896 (*Underwood & Earle*).
South Carolina.

Boletus rubinellus Peck.
Cornell Bull. 26.
Woods, on ground. Lee County, Auburn, August, 1890 (*Atkinson*).

Boletus russellii Frost.
Cornell Bull. 26.
Woods, on ground. Lee County, Auburn, summer, 1890 (*Atkinson*).

Boletus tabacinus Peck, Bull. Torr. Club, **23**: 418. 1896.
Ala. Bull. 251.
Along roadsides. Lee County, May, 1896 (*Underwood & Earle*).

Boletus underwoodii Peck, Bull. Torr. Club, **24**: 145. 1897.
Ala. Bull. 251.
Lee County, Auburn, July, 1896 (*Underwood & Earle*).

BOLETINUS Kalchbrenner.[1] (BOLETOPSIS Hennings.)

Boletinus decipiens B. & C.
Ala. Bull. 248.
Lee County, October, December, 1896 (*Baker*).

Boletinus pictus Peck.
Lee County, Auburn, June, 1897 (*Earle & Baker*).

Boletinus ravenelii (B. & C.)
Ala. Bull. 251, under Boletus.
Lee County, July, 1896 (*Underwood & Earle*).
South Carolina.

Boletinus subluteus (Peck).
Ala. Bull. 251. Cornell Bull. 26. In both under Boletus.
Lee County, Auburn, July, 1890 (*Atkinson*); October, November, 1896 (*Earle*).

STROBILOMYCES Berk.

Strobilomyces strobilaceus (Scop.) Berk.
Peters coll. No. 33. Ala. Bull. 252.
Lawrence County (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).
New Jersey. Europe.

Family AGARICACEAE.[2]

Tribe CANTHARELLEAE.

CANTHARELLUS Lév.

Cantharellus cantharellus (L.).
Ala. Bull. 256. Cornell Bull. 25, as *C. cibarius* Fr.
Lee County, Auburn, August, 1890 (*Atkinson*); Winston County, June, 1896 (*Underwood*); Lee County, July, 1896 (*Underwood & Earle*).
Ohio, New Jersey. Europe.
Edible; commonly known as chantarelle.

Cantharellus cinnabarinus Schw.
Ala. Bull. 256.
Lee County, July, 1896 (*Underwood & Earle*)
New Jersey.

Cantharellus floccosus Schw.
Ala. Bull. 256.
Winston County, June, 1896 (*Underwood*).

Cantharellus infundibuliformis (Scop.) Fr.
Ala. Bull. 256. Cornell Bull. 25.
Lee County, Auburn, August, 1890 (*Atkinson*). Pileus very much lobed and irregular.
Winston County, June, 1896 (*Underwood*).
New Jersey. Europe.

Cantharellus petersii B. & C.
Rav. Fung. Car. Exsic. **5**:12. Ala. Bull. 256. Cornell Bull. 25.
On base of trees. Northern Alabama (*Peters*).
Lee County, Auburn, July, 1890 (*Atkinson*).

---

[1] Hennings has proposed the name Boletopsis for those species of Boletinae having an annulus (Engler & Prantl, Pflanzenfam. 1 Teil, Abt. **1****:194. 1898), but as noted by Underwood (Bull. Torr. Club, **25**:630) the older name of Boletinus must be retained if the species belonging to it are to be included in the new grouping.

[2] Hennings's treatment of the Agaricaceae in the Natuerlichen Pflanzenfamilien does not seem to meet the full approval of American mycologists. It seems best, therefore, for the purposes of this catalogue to follow the generic names used by Saccardo in the Sylloge Fungorum rather than to make the many new binomial combinations that would be necessary if Hennings's treatment of the family were to be fully adopted.—F. S. Earle.

Tribe COPRINEAE.

COPRINUS Pers.

Coprinus atramentarius (Bull.) Fr.
Ala. Bull. 258. Cornell Bull. 25.
Lee County, Auburn, autumn, 1890 (*Atkinson*); Lee County, March, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

Coprinus comatus Fr.
Ala. Bull. 258.
Lee County, April, 1896 (*Underwood & Earle*). Edible.
New Jersey, Ohio. Europe.

Coprinus plicatilis (Curt.) Fr.
Peters coll. No. 13, as *C. picaceus*. Cornell Bull. 25.
Northern Alabama (*Peters*).

Coprinus sterquilinus Fr. (?).
Lee County, May, 1897 (*Mrs. F. S. Earle*).
Europe.

Coprinus virgineus Banning?
Lee County, June, 1897 (*Baker*).

Tribe HYGROPHOREAE.

GOMPHIDIUS Fr.

Gomphidius gracilis Berk. (?).
Lee County, November, 1896 (*Baker*).

Gomphidius rhodoxanthus Schw.
Ala. Bull. 259.
Lee County, July, 1896 (*Underwood & Earle*); October, December, 1896 (*Earle*).
New Jersey.

HYGROPHORUS Fr.

Hygrophorus cantharellus Schw.
Cornell Bull. 24.
Lee County, Auburn, summer, 1890 (*Atkinson*).

Hygrophorus conicus (Scop.) Fr.
Peters coll. No. 12. Ala. Bull. 259.
Northern Alabama, October, 1864 (*Peters*).
New Jersey. Europe.

Hygrophorus nitidus B. & Rav.
Lee County, April, 1897 (*Mrs. F. S. Earle*).

Hygrophorus olivaceo-albus Fr. (?).
Lee County, December, 1897 (*Earle*).
Europe.

NYCTALIS Fr.

Nyctalis asterophora Fr.
Peters coll. Ala. Bull. 262.
Parasitic on Lactarius. Northern Alabama, 1863 (*Peters*).
New Jersey. Europe.

Tribe LACTARIEAE.

LACTARIUS Pers.

Lactarius affinis Peck.
Cornell Bull. 26.
On the ground. Lee County, Auburn, October 19, 1890 (*Atkinson*).

Lactarius chelidonium Peck.

Ala. Bull. 260.
Lee County, July, 1896 (*Underwood & Earle*); October, November, 1896 (*Earle*).

Lactarius corrugis Peck.

Lee County, September, 1897 (*Earle*).

Lactarius deceptivus Peck.

Ala. Bull. 260.
Lee County, July, 1896 (*Underwood & Earle*).

Lactarius deliciosus (L.) Fr.

Cornell Bull. 25.
On the ground in open woods. Lee County, Auburn, October 19, 1890 (*Atkinson*).
New Jersey, Ohio. Europe.

Lactarius fuliginosus Fr.

Cornell Bull. 26.
Lee County, Auburn (*Atkinson*).
Europe.

Lactarius indigo (Schw.) Fr.

Ala. Bull. 260. Cornell Bull. 26.
On the ground in damp woods near stream. Lee County, Auburn, August, 1890 (*Atkinson*).
Lee County, July, 1896 (*Underwood & Earle*); November, 1896 (*Farle*).
New Jersey.

Lactarius insulsus Fr.

Ala. Bull. 260. Cornell Bull. 25.
On the ground. Lee County, Auburn, summer, 1891 (*Atkinson*).
Lee County, July, 1896 (*Underwood & Earle*); October, 1896 (*Earle*).
Europe.

Lactarius lignyotus Fr.

Cornell Bull. 26.
Lee County, Auburn (*Atkinson*).
Europe.

Lactarius pergamenus (Sw.) Fr.

Cornell Bull. 26.
In woods on the ground. Lee County, Auburn, August, 1890 (*Atkinson*).
Ohio. Europe.

Lactarius piperatus (Scop.) Fr.

Ala. Bull. 260. Cornell Bull. 26.
In woods on the ground. Lee County, Auburn, July, 1890 (*Atkinson*).
Hale County, May, 1896 (*Underwood*). Winston County, June, 1896 (*Underwood*).
Lee County, July, 1896 (*Underwood & Earle*); October, November, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Lactarius salmoneus Peck, Bull. Torr. Club, **25**: 369. 1898.

Lee County, July, 1897 (*Earle & Baker*).

Lactarius scrobiculatus (Scop.) Fr.

Ala. Bull. 260.
Lee County, October, November, 1896 (*Earle*).
Europe.

Lactarius subdulcis Bull.

Ala. Bull. 260.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey. Europe.

Lactarius subvellereus Peck, Bull. Torr. Club, **25**: 369. 1898.

Lee County, July, 1897 (*Earle*).

Lactarius theiogalus Bull.

Ala. Bull. 260. Cornell Bull. 25.
On the ground. Lee County, Auburn, July, 1890 (*Atkinson*).
Lee County, October, November, 1896 (*Earle*).
New Jersey. Europe.

Lactarius vellereus Fr.

Ala. Bull. 260.
Lee County, October, November, December, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Lactarius vellereus subrugosus Peck.

In pine grove. Mobile County, Springhill (*Baker*).

Lactarius volemus Fr.

Ala. Bull. 260. Cornell Bull. 25.
On ground. Lee County, Auburn (*Atkinson*).
Winston County, June, 1896 (*Underwood*).
Lee County, July, 1896 (*Underwood & Earle*).

RUSSULA Pers.

Russula adusta (Pers.) Fr.

Ala. Bull. 264. Cornell Bull. 26.
Lee County, November, 1896 (*Earle*).
Europe.

Russula albella Peck.

Ala. Bull. 264.
Lee County, October, November, 1896 (*Earle*).

Russula albidula Peck, Bull. Torr. Club, **25**: 370. 1898.

In pine woods. Lee County, Auburn, November, 1897 (*Earle*)

Russula brevipes Peck.

Ala. Bull. 264.
Lee County, December, 1895 (*Underwood*); October, 1896 (*Earle*).

Russula chamaeleontina Fr.

Ala. Bull. 264.
Lee County, November, 1896 (*Earle*).
Europe.

Russula delica Fr.

Lee County, December, 1896 (*Baker*).
Europe.

Russula emetica Fr.

Ala. Bull. 264.
Lee County, November, December, 1896 (*Earle*).
New Jersey. Europe.

Russula foetens (Pers.) Fr.

Ala. Bull. 264. Cornell Bull. 26.
On the ground in woods. Lee County, Auburn, August, 1890 (*Atkinson*).
Lee County, October, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Russula fragilis (Pers.) Fr.

Lee County, November, December, 1896 (*Baker*).
Europe.

Russula lactea (Pers.) Fr.

Lee County, November, December (*Baker*)
Europe.

Russula lepida Fr.

Ala. Bull. 264.
Lee County, October, 1896 (*Earle*).
Ohio. Europe.

Russula polyphylla Peck, Bull. Torr. Club, **25**: 370. 1898.

Lee County, July, 1897 (*Earle & Baker*).

Russula pusilla Peck.

Ala. Bull. 264.
Lee County, December, 1895 (*Underwood*).

Russula vellerea Fr.

Lee County, December, 1896 (*Baker*).

Russula virescens (Schaef.) Fr.

Ala. Bull. 265.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.
Edible.

Tribe SCHIZOPHYLLEAE.

SCHIZOPHYLLUM Fr.

Schizophyllum commune Fr.

Ala. Bull. 265. Cornell Bull. 26.
On standing trunks and branches. Mobile County, December, 1895 (*Earle*). Lee County, February, June, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).
On diseased timber; common throughout the State.
Louisiana, New Jersey, Ohio. Europe.

Tribe MARASMIEAE.

XEROTUS Fr.

Xerotus viticola B. & C.

Peters coll., as *X. nigrata*. Ala. Bull. 265.
(*Peters.*)
South Carolina.

LENTINUS Fr.

Lentinus lecontei Fr.

Ala. Bull. 260. Cornell Bull. 26.
On dead trunks. Lee County, Auburn, February 22, 1891 (*Atkinson*).
Louisiana, New Jersey, Ohio.

Lentinus lepideus Fr.

Ala. Bull. 260. Cornell Bull. 26.
In woods. Lee County, Auburn, August, 1890 (*Atkinson*).
On pine wood. Lee County, May, June, July, 1896 (*Underwood & Earle*); October, December, 1896 (*Earle*).

Lentinus ravenelii B. & C.

Ala. Bull. 260.
(*Beaumont.*)
South Carolina.

Lentinus strigosus Fr.

Ala. Bull. 260.
Lee County, February, April, 1896 (*Underwood & Earle*); Tuscaloosa County, May, 1896 (*Underwood*); Winston County, June, 1896. Rather common.

Lentinus tigrinus (Bull.) Fr.

Peters coll. Ala. Bull. 260.
Northern Alabama (*Peters*). Lee County, April, 1896 (*Underwood & Earle*).
Ohio. Europe.

Lentinus underwoodii Peck, Bull. Torr. Club, **23**: 414. 1896.

Ala. Bull. 260.
On Quercus. Macon County, July, 1896 (*Underwood*).

Lentinus ventricosus Peck, Bull. Torr. Club, **23**: 414. 1896.

Ala. Bull. 261.
On the ground. Lee County, December, 1895 (*Underwood*); November, 1896 (*Earle*).
This curious species can hardly be a Lentinus. The gills are not notched; the flesh is soft and watery, and it has a remarkable thick leathery veil. When these plants are revised, it will doubtless stand as the type for a new genus.

PANUS Fr.

Panus dealbatus Fr.
Rav. Fung. Car. Exsic. **5**:9. Ala. Bull. 263.
On Fraxinus (*Peters*).
Ohio.

Panus dorsalis Bosc.
Cornell Bull. 25.
Summer, 1890 (*Atkinson*).
New Jersey, Ohio.

Panus laevis B. & C.
Ala. Bull. 263.
Lee County, October, 1896 (*Burton*).

Panus nigrifolius Peck, Bull. Torr. Club, **25**:370. 1898.
Lee County, July, 1897 (*Baker & Earle*).

Panus stipticus (Bull.) Fr.
Ala. Bull. 263. Cornell Bull. 25.
On dead branches. Lee County, Auburn, August, 1890 (*Atkinson*).
Lee County, November, December, 1895 (*Underwood*).
Louisiana, New Jersey, Ohio. Europe.

Panus torulosus Fr.
Cornell Bull. 25.
Lee County, Auburn, summer, 1891 (*Atkinson*).
Europe.

MARASMIUS Fr.

Marasmius anomalus Peck.
Cornell Bull. 26.
Lee County, Auburn, summer, 1890 (*Atkinson*).
Ohio.

Marasmius atrorubens Berk.
Cornell Bull. 26.
Lee County, Auburn, summer, 1890 (*Atkinson*).

Marasmius capillaris Morgan.
Cornell Bull. 26.
Lee County, Auburn, July, 1890 (*Atkinson*).
Ohio.

Marasmius curreyi B. & R.
Cornell Bull. 26.
On dead blades of *Syntherisma sanguinale*. Lee County, Auburn, August 3, 1891 (*Atkinson*).

Marasmius hinnuleus B. & C. (?).
Cornell Bull. 26.
Lee County, Auburn, July, 1890 (*Atkinson*).

Marasmius opacus B. & C.
Cornell Bull. 26.
Lee County, Auburn (*Atkinson*).

Marasmius putredinus B. & C.
On rotting wood. Lee County, Auburn, 1890 (*Atkinson*).

Marasmius rotula (Scop.) Fr.
Peters coll. Ala. Bull. 262.
Northern Alabama, September, October (*Peters*). Lee County, May, 1896 (*Underwood & Earle*).
Louisiana, New Jersey. Europe.

Marasmius salignus Peck.
Cornell Bull. 26.
Lee County, Auburn, July, 1890 (*Atkinson*).

Marasmius semiustus B. & C.

Cornell Bull. 26.
On decaying grass stems. Lee County, Auburn, July, 1890 (*Atkinson*).
Lee County, July, 1867 (*Earle & Baker*).

Marasmius subnudus (Ellis) Peck.

Lee County, July, 1897 (*Earle & Baker*).

Marasmius viticola B. & C.

Peters coll., under Merulius. Ala. Bull. 262.
Northern Alabama (*Peters*).

HELIOMYCES Lév.

Heliomyces decolorans B. & C.

Rav. Fung. Car. Exsic. 5:7. Ala. Bull. 259.
On dead wood. Northern Alabama (*Peters*).

Tribe AGARICINAE.

PSATHYRELLA Fr.

Psathyrella disseminata Pers.

Cornell Bull. 25.
On the ground in cultivated fields. Lee County, Auburn, July, 1890 (*Atkinson*).
New Jersey. Europe.

PANAEOLUS Fr.

Panaeolus solidipes Peck.

Lee County, July, 1897 (*Baker*).

Panaeolus sphinctrinus Fr.

Ala. Bull. 263.
On dung. Lee County, March, 1896 (*Underwood & Earle*).
Europe.

Panaeolus retirugis Fr.

Lee County, July, 1897 (*Baker*).
Europe.

PSILOCYBE Fr.

Psilocybe foenisecii Pers.

Ala. Bull. 264.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Psilocybe subericaea Fr.

Ala. Bull. 264.
Low ground. Lee County, January, 1896 (*Underwood & Earle*).

HYPHOLOMA Fr.

Hypholoma fasciculare Huds.

Cornell Bull. 25.
On the ground. Lee County, Auburn, summer, 1890 (*Atkinson*).
Ohio. Europe.

Hypholoma modestum Peck. (?)

Ala. Bull. 259.
Lee County, July, 1896 (*Underwood & Earle*).

Hypholoma perplexum Peck.

Ala. Bull. 259.
Lee County, November, 1896 (*Earle*).

Hypholoma sublateritium Schaeff.

Ala. Bull. 260. Cornell Bull. 25.
In clusters by side of decaying log. Lee County, Auburn. December, 1890 (*Atkinson*).
Lee County, December, 1895 (*Underwood*).
Ohio. Europe.

CREPIDOTUS Fr.

Crepidotus applanatus Pers.

Peters coll. No. 8, as *Panus flabelliformis*. Ala. Bull. 258.
On Hicoria (*Peters*).

Crepidotus applicatus Peck.

Ala. Bull. 258.
Lee County, May, 1896 (*Underwood & Earle*).

Crepidotus dorsalis Peck.

Cornell Bull. 25.
Lee County, Auburn, summer, 1890 (*Atkinson*).
Ohio.

Crepidotus fulvotomentosus Peck.

Ala. Bull. 258.
Lee County, May, 1896 (*Underwood & Earle*).

Crepidotus malachius B. & C.

Lee County, July, 1897 (*Earle & Baker*).

Crepidotus versutus Peck.

Lee County, July, 1897 (*Earle & Baker*).
Ohio.

GALERA Fr.

Galera tenera Schaeff.

Peters coll. Ala. Bull. 259.
(*Peters.*)
New Jersey, Ohio. Europe.

INOCYBE Fr.

Inocybe vatricosa Fr.

Ala. Bull. 260.
On pine chips. Lee County, January, 1896 (*Underwood & Earle*).

CORTINARIUS Fr.

Cortinarius delibutus Fr.

Ala. Bull. 258.
Lee County, October, 1896 (*Earle*).
Europe.

Cortinarius iodes B. & C.

Ala. Bull. 258.
Lee County, October, November, 1896 (*Earle*).

Cortinarius porphyropus Fr.

Ala. Bull. 258.
Lee County, November, 1896 (*Earle*).
Europe.

Cortinarius purpurascens Fr.

Ala. Bull. 258.
Lee County, November, 1896 (*Earle*).
Europe.

FLAMMULA Fr.

Flammula flavida Pers.

Peters coll. Ala. Bull. 258.
October, 1864 (*Peters*). Lee County, December, 1896 (*Earle*).

Flammula sapinea Fr.

Ala. Bull. 258.
Mobile County, June, 1896 (*Earle*). Lee County, October, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Flammula underwoodii Peck, Bull. Torr. Club, **23**:415. 1896.

Ala. Bull. 258.
On pine trunks. Lee County, November, 1895 (*Underwood*).

NAUCORIA Fr.

Naucoria semiorbicularis Bull.

Ala. Bull. 262.

Lee County, June, July, 1896 (*Underwood & Earle*); Mobile County, June, 1896 (*Earle*).

New Jersey, Ohio.

PHOLIOTA Fr.

Pholiota sabulosa Peck, Bull. Torr. Club, **23**:414. 1896.

Ala. Bull. 263.

In sandy soil. Lee County, December, 1895 (*Underwood*).

AGARICUS L.

Agaricus campestris L.

Ala. Bull. 253. Cornell Bull. 25.

In grassy lawns and fields. Lee County, autumn, 1890 (*Atkinson*); November, 1895 (*Underwood*); February, March, July, 1896 (*Underwood & Earle*).

Cosmopolitan.

The common edible field mushroom.

Agaricus placomyces Peck.

Ala. Bull. 253. Cornell Bull. 25.

In woods. Lee County, Auburn, July, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*).

Agaricus silvaticus Schaeff.

Cornell Bull. 25.

In woods. Lee County, Auburn, August, 1890 (*Atkinson*).

Ohio. Europe.

STROPHARIA Fr.

Stropharia bilamellata Peck.

Ala. Bull. 265.

Lee County, July, 1896 (*Underwood & Earle*).

Stropharia melasperma Bull.

Cornell Bull. 25.

Lee County, Auburn, summer, 1890 (*Atkinson*).

Europe.

CLAUDOPUS Worth. Smith.

Claudopus nidulans Pers.

Ala. Bull. 256.

Lee County, December, 1895 (*Underwood*); November, December, 1896 (*Earle*).

Europe.

CLITOPILUS Fr.

Clitopilus abortivus B. & C.

Ala. Bull. 257.

Lee County, October, 1896 (*Earle*).

Ohio.

ENTOLOMA Fr.

Entoloma cuspidatum Peck.

Lee County, August, 1897 (*Earle*).

PLUTEUS Fr.

Pluteus cervinus Schaeff.

Ala. Bull. 264.

Lee County, 1891 (*Atkinson*); February, May, 1896 (*Underwood & Earle*).

Ohio. Europe

Pluteus cervinus albipes Peck.

Lee County, April, 1897 (*Baker*).

Pluteus curtisii Berk.
Peters coll. Ala. Bull. 264.
September, October, 1864 (*Peters*).

PLEUROTUS Fr.

Pleurotus applicatus Batsch.
Ala. Bull. 264.
On bark. Lee County, November, 1895 (*Underwood*).
On Vitis. Lee County, November, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Pleurotus chioneus Pers.
Cornell Bull. 25.
On decaying wood. Summer, 1890 (*Atkinson*).
Europe.
Small; about 1 cm. in diameter.

Pleurotus niger Fr.
Peters coll., as *Agaricus ater*. Ala. Bull. 264.
August, 1855 (*Peters*).
Ohio.

Pleurotus sapidus Kalchb.
Ala. Bull. 264. Cornell Bull. 25.
On dead limbs of trees. Lee County, Auburn, August, 1890 (*Atkinson*).
On various dead trunks. Mobile County, December, 1895 (*Earle*). Lee County, January, 1896 (*Underwood & Earle*); November, 1896 (*Earle*).
Ohio. Europe.

Pleurotus subbarbatus B. & C.
Cornell Bull. 25.
Lee County, Auburn, July, 1890 (*Atkinson*).

OMPHALIA Fr.

Omphalia campanella Batsch.
Lee County, August, 1897 (*Earle & Baker*).
New Jersey, Ohio. Europe.

Omphalia eximia Peck.
Lee County, August, 1897 (*Earle & Baker*).

Omphalia grisea Fr.
Cornell Bull. 25.
On ditch bank in sandy soil. Lee County, Auburn, 1890 (*Atkinson*).
Europe.

Omphalia pubescentipes Peck, Bull. Torr. Club, **24**: 141. 1897.
Ala. Bull. 263.
Lee County, December, 1896 (*Earle*).

Omphalia subpellucida B. & C.
Cornell Bull. 25.
Lee County, Auburn, summer, 1890 (*Atkinson*).

MYCENA Fr.

Mycena epipterygia Scop.
Ala. Bull. 262.
Lee County, December, 1896 (*Earle*).
New Jersey. Europe.

Mycena vulgaris Pers.
Lee County, February, 1897 (*Earle & Baker*).
Europe.

COLLYBIA Fr.

Collybia albipilata Peck.
Ala. Bull. 257.
On dead cones of Pinus. Lee County, December, 1896 (*Earle*).

Collybia dryophila Bull.

Peters coll. Ala. Bull. 257.
August, September, 1864 (*Peters*). Lee County, January, 1896 (*Underwood & Earle*).
Ohio. Europe.

Collybia luxurians Peck, Bull. Torr. Club, **24**: 141. 1897.

Ala. Bull. 257.
Under a brush heap. Lee County, July, 1896 (*Underwood & Earle*).

Collybia platyphylla Fr.

Ala. Bull. 257.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

Collybia radicata Relh.

Peters coll. Ala. Bull. 257. Cornell Bull. 24.
Growing from buried roots. Lee County, Auburn, July, 1890 (*Atkinson*).
September, 1864 (*Peters*). Tuscaloosa County, May, 1896 (*Underwood*); Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

Collybia stipitaria Fr.

Peters coll. Ala. Bull. 258.
September, 1864 (*Peters*).
Ohio. Europe.

Collybia zonata Peck.

Ala. Bull. 258.
September, 1864 (*Peters*).
New Jersey, Ohio.

CLITOCYBE Fr.

Clitocybe ectypa Fr.

Cornell Bull. 24.
Lee County, Auburn, August, 1890 (*Atkinson*).
Europe.

Clitocybe ectypoides Peck.

Ala. Bull. 256.
Lee County, November, 1896 (*Earle*).

Clitocybe illudens Schw.

Lee County, November, 1897 (*Earle & Baker*).
New Jersey, Ohio.

Clitocybe inversa Scop.

Ala. Bull. 256.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Clitocybe laccata Scop.

Ala. Bull. 257.
Mobile County, December, 1895 (*Earle*). Lee County, December, 1895 (*Underwood*); January, March, 1896 (*Underwood & Earle*); October, December, 1896 (*Earle*).
Europe.

Clitocybe monadelpha Morgan.

Lee County, January, 1896 (*Baker*).
Ohio.

Clitocybe ochropurpurea Berk.

Peters coll., as *Agaricus tyrianthus*. Ala. Bull. 257.
September, October, 1864 (*Peters*).
Lee County, November, December, 1896 (*Earle*).

TRICHOLOMA Fr.

Tricholoma brevipes Bull.

Cornell Bull. 25.
Lee County, Auburn, summer, 1891 (*Atkinson*).
Europe.

Tricholoma cuneifolium Fr.

Ala. Bull. 265.
In sandy soil. Lee County, January, 1896 (*Underwood & Earle*).
Europe.

Tricholoma equestris L.
Ala. Bull. 265.
Lee County, November, 1896 (*Earle*).
Europe.

Tricholoma leucocephalum Fr.
Ala. Bull. 265.
Lee County, October, 1896 (*Earle*).
Europe.

Tricholoma russula Schaeff.
Ala. Bull. 265.
Lee County, November, December, 1896 (*Earle*).
Europe.

Tricholoma terreum Schaeff.
Ala. Bull. 265.
Lee County, January, 1896 (*Underwood & Earle*).
Ohio. Europe.

Tricholoma tricolor Peck.
Ala. Bull. 265.
Lee County, November, 1896 (*Earle*).

ARMILLARIA Fr.

Armillaria appendiculata Peck, Bull. Torr. Club, **24**: 140. 1897.
Ala. Bull. 255.
Lee County, October, 1896 (*Baker*).

Armillaria bulbigera A. & S.
Cornell Bull. 24.
Lee County, Auburn, December, 1890 (*Atkinson*).

Armillaria mellea Vahl.
Peters coll. Ala. Bull. 256. Cornell Bull. 24.
About stumps. October, November, 1864 (*Peters*).
Lee County, November, December, 1895 (*Underwood*); July, 1896 (*Underwood & Earle*); October, November, December, 1896 (*Earle*).
New Jersey. Europe.

LEPIOTA Fr.

Lepiota acutesquamosa Weinm.
Peters coll. Ala. Bull. 261.
October, 1864 (*Peters*).
Europe.

Lepiota americana Peck.
Cornell Bull. 25.
Lee County, Auburn (*Atkinson*).
New Jersey, Ohio.

Lepiota asperata Berk.
Cornell Bull. 25.
In grassy places. Lee County, Auburn, August, 1890 (*Atkinson*).

Lepiota cristata Alb. & Schw.
Lee County, August, 1897 (*Baker*).
New Jersey, Ohio.

Lepiota delicata Fr.
Lee County, July, 1897 (*Earle & Baker*).
Europe.

Lepiota earlei Peck, Bull. Torr. Club, **25**: 368. 1898.
Lee County, August, 1897 (*Earle*)

Lepiota excoriata Schaeff.
Cornell Bull. 24.
In grassy places. Lee County, Auburn, July, 1890 (*Atkinson*).
Europe.

Lepiota longistriata Peck, Bull. Torr. Club, **25**: 368. 1898.
Lee County, August, 1897 (*Mrs. F. S. Earle*).

Lepiota mammaeformis Underwood, Bull. Torr. Club, **24**: 82. 1897.
Ala. Bull. 261.
At base of Broussonetia. Lee County, July, 1896 (*Underwood*).

Lepiota morgani Peck.
Ala. Bull. 262.
Lee County, July, 1896 (*Underwood & Earle*).
Ohio.

Lepiota procera Scop.
Ala. Bull. 262.
Lee County, November, 1896 (*Earle*).
Ohio. Europe.
Edible.

Lepiota subremota B. & C.
Cornell Bull. 25.
In grassy fields and open woods. Lee County, Auburn, summer, 1890 (*Atkinson*).

AMANITOPSIS Roze.

Amanitopsis agglutinosus (B. & C.) Sacc.
Cornell Bull. 24.
Lee County, Auburn, 1890 (*Atkinson*).

Amanitopsis farinosus (Schw.) Peck.
Lee County, July 7, 1897 (*Earle & Baker*).
New Jersey.

Amanitopsis nivalis Peck.
Cornell Bull. 24.
Lee County, Auburn, August, 1890 (*Atkinson*).

Amanitopsis strangulatus (Fr.) Roze.
Ala. Bull. 255.
Lee County, November, 1896 (*Earle*).
New Jersey, Ohio.

Amanitopsis vaginatus (Bull.) Roze.
Peters coll. Ala. Bull. 255. Cornell Bull. 24.
September, October, 1864 (*Peters*); Lee County, Auburn, July, August, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio, District of Columbia.

Amanitopsis volvatus (Peck) Sacc.
Ala. Bull. 255.
Lee County, July, 1896 (*Underwood & Earle*).
Ohio.

AMANITA Fr.

Amanita abrupta Peck, Bull. Torr. Club, **24**: 138. 1897.
Ala. Bull. 253.
Lee County, July, 1896 (*Underwood & Earle*).

Amanita caesarea Scop.
Ala. Bull. 253. Cornell Bull. 24.
Tuscaloosa County, May, 1896 (*Underwood*). Lee County, July, 1896 (*Underwood & Earle*); October, 1896 (*Earle*).
Ohio, Indiana. Europe.
Abundant; edible.

Amanita candida Peck, Bull. Torr. Club, **24**: 137. 1897
Ala. Bull. 253.
Lee County, October, 1896 (*Earle*).

Amanita chlorinosa (Peck) Underwood & Earle.
Ala. Bull. 254.
Lee County, November, 1896 (*Earle*).

Amanita frostiana Peck.

Lee County, July, 1896 (*Underwood & Earle*).

Amanita muscaria L.

Ala. Bull. 254.
Lee County, October, 1896 (*Burton*); November, December, 1896 (*Baker*).
Southern New England, District of Columbia.
The "fly agaric"; poisonous. Frequent.

Amanita pantherina DC.

Cornell Bull. 24.
Lee County, Auburn, July, August, 1890 (*Atkinson*).
Ohio. Europe.

Amanita phalloides Fr.

Ala. Bull. 255. Cornell Bull. 24.
Lee County, Auburn, August, 1890 (*Atkinson*). Lee County, December, 1895 (*Underwood*); July, 1896 (*Underwood & Earle*); October, 1896 (*Earle*). Mobile County, December, 1895 (*Earle*).
Europe.
A deadly poison, for which no antidote is known.

Amanita ravenelii B. & C.

Cornell Bull. 24.
Lee County, Auburn, August, 1890 (*Atkinson*).

Amanita rubescens Fr.

Ala. Bull. 255.
Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio, District of Columbia. Europe.

Amanita solitaria Bull.

Ala. Bull. 255. Cornell Bull. 24.
Lee County, Auburn, August, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*).
Europe.

Amanita spreta Peck.

Ala. Bull. 255. Cornell Bull. 24.
In open woods. Lee County, Auburn, July, 1890 (*Atkinson*); July, November, 1896 (*Earle*).

Amanita strobiliformis Vitt.

Ala. Bull. 255.
Lee County, October, 1896 (*Earle*).
Europe.

Amanita virosa Fr.

Ala. Bull. 255.
Lee County, July, 1896 (*Underwood & Earle*).
Europe.
Poisonous.

Order PHALLALES.

Family CLATHRACEAE.

CLATHRUS Micheli.

Clathrus columnatus Bosc.

Ala. Bull. 265.
Lee County, November, 1896 (*Baker*).

Family PHALLACEAE.

MUTINUS Fr.

Mutinus caninus (Huds.) Fr.

Ala. Bull. 265.
Lee County, November, 1896 (*Earle*).
Ohio. Europe.

DICTYOPHORA Desv.

Dictyophora duplicata (Bosc.) E. Fisher.
Ala. Bull. 265.
Winston County, June, 1896 (*Underwood*).
Ohio.

Dictyophora ravenelii (B. & C.) Burton.
Ala. Bull. 265.
Lee County, May, 1896 (*Underwood & Earle*).
New Jersey, Ohio.

PHALLUS Micheli.

Phallus rubicundus Bosc.
Peters coll. Ala. Bull. 266.
Hale County, May, 1896 (*Underwood*).

Order HYMENOGASTRALES.

Family HYMENOGASTRACEAE.

OCTAVIANA Vitt.

Octaviana compacta Tul.
Ala. Bull. 268.
Lee County, July, 1896 (*Underwood & Earle*).

Octaviana stephensii ravenelii Berk.
Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*).
New Jersey.

RHIZOPOGON Fr.

Rhizopogon rubescens Tul.
Peters coll. No. 68. Ala. Bull. 268. Cornell Bull. 23.
On the ground. Lee County, Auburn, August, 1890 (*Atkinson*).
Winston County (*P. P. Payne*). Lee County, December, 1895 (*Underwood*); March, 1896 (*Underwood & Earle*); December, 1896 (*Earle*).
New Jersey. Europe.

Order LYCOPERDALES.

Family LYCOPERDACEAE.

TYLOSTOMA Pers.

Tylostoma fimbriatum Fr.
Ala. Bull. 267.
Lee County, October, 1896 (*Earle*). Macon County, December, 1896 (*Carver*).
South Carolina. Europe.

LYCOPERDON Tourn.

Lycoperdon acuminatum Bosc.
On living trunks. Lee County, February, 1897 (*Earle & Baker*).
Ohio.

Lycoperdon asterospermum Dur. & Mont.
Ala. Bull. 267.
Lee County, July, 1896 (*Underwood & Earle*).
Ohio.

Lycoperdon calyptriforme B. & C.
Cornell Bull. 23.
Lee County, Auburn, July, 1890 (*Atkinson*).
North Carolina.

Lycoperdon cepaeforme Bull.
Ala. Bull. 267. Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*).
Ohio. Europe.

Lycoperdon curtisii Berk.
Lee County, December, 1897 (*Earle & Baker*).
North Carolina, Ohio, New England.

Lycoperdon echinatum Pers.
Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*).
Ohio.

Lycoperdon epixylon B. & C.
Lee County, August, 1897 (*Earle & Baker*).

Lycoperdon excipuliforme Scop.
Cornell Bull. 23.
Lee County, Auburn (*Atkinson*); common.
Europe.

Lycoperdon eximium Morgan.
Ala. Bull. 267. Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*).

Lycoperdon fuliginosum B. & C.
Cornell Bull. 23.
On decaying logs. Lee County, Auburn, August 4, 1890 (*Atkinson*).

Lycoperdon gemmatum Batsch.
Ala. Bull. 267.
Lee County, July, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, Ohio. Europe.

Lycoperdon peckii Morgan.
Ala. Bull. 267.
Ohio.

Lycoperdon pedicellatum Peck.
Ala. Bull. 267. Cornell Bull. 23.
On ground in open woods. Lee County, Auburn, February 22, 1891 (*Atkinson*); Tuscaloosa County, May, 1896 (*Underwood*).
Ohio.

Lycoperdon pusillum Batsch.
Ala. Bull. 267. Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

Lycoperdon pyriforme Schaeff.
Ala. Bull. 267.
Lee County, December, 1895 (*Underwood*); February, June, 1896 (*Underwood & Earle*); October, November, 1896 (*Earle*).
New Jersey, Ohio. Europe.

Lycoperdon rimulatum Peck.
Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*).
Ohio.

Lycoperdon separans Peck.
Ala. Bull. 267. Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*); Lee County, March, June, July, 1896 (*Underwood & Earle*).
Ohio.

Lycoperdon turneri E. & E.

Ala. Bull. 267. Cornell Bull. 23.
On the ground in open woods. Lee County, Auburn, February 22, 1891 (*Atkinson*).
Lee County, July, 1896 (*Underwood & Earle*).
Ohio.

Lycoperdon wrightii B. & C.

Cornell Bull. 23.
Lee County, Auburn, 1890 (*Atkinson*).
Louisiana, Ohio, Connecticut.

CALOSTOMA Desv.

Calostoma cinnabarinum (Desv.) Mass.

Ala. Bull. 266.
(*Atkinson.*)

Calostoma lutescens (Schw.) Mass.

Calhoun County, Macon, February, 1898 (*Carver*); Mobile County (*Mohr*).
Texas, New Jersey.

Calostoma ravenelli (Berk.) Mass.

Ala. Bull. 266.
Lee County, March, 1896 (*Underwood & Earle*).

CALVATIA Fr.

Calvatia craniiformis (Schw.) Fr.

Ala. Bull. 266.
Lee County, July, 1896 (*Underwood & Earle*); November, 1896 (*Earle*).
Ohio

Calvatia cyathiformis (Bosc.) Morgan.

Ala. Bull. 266. Cornell Bull. 23, under *Lycoperdon.*
Lee County, Auburn (*Atkinson*). Lee County, October, 1895 (*Underwood*); January, July, 1896 (*Underwood & Earle*); September, 1896 (*Earle*).
Louisiana, New Jersey, Ohio.

Calvatia fragilis (Vitt.) Morgan.

Ala. Bull. 266.
Lee County, July, 1896 (*Underwood & Earle*).
North Carolina, South Carolina.

CATASTOMA Morgan.

Catastoma circumscissum (B. & C.) Morgan.

Ala. Bull. 266.
Mobile County, December, 1895 (*Underwood*).
Maine.

Catastoma pedicellatum Morgan.

Ala. Bull. 266.
Lee County, July, 1896 (*Underwood & Earle*); September, 1896 (*Earle*).
Ohio.

CAULOGLOSSUM Grev.

Cauloglossum transversarium (Bosc.) Fr.

In sphagnum swamp. Lee County, November, 1897 (*Earle*).
South Carolina.

BOVISTELLA Morgan.

Bovistella ohiensis (E. & M.) Morgan.

Ala. Bull. 266. Cornell Bull. 22.
Common on the ground. Lee County, Auburn (*Atkinson*).
Lee County, December, 1895 (*Underwood*); April, July, 1896 (*Underwood & Earle*); October, November, December, 1896 (*Earle*). Winston County, June, 1896 (*Underwood*).
Ohio.

BOVISTA Pers.

Bovista minor Morgan.
Ala. Bull. 266.
Lee County, December, 1895 (*Underwood*).
Ohio.

GEASTER Micheli.

Geaster fimbriatus Fr.
Ala. Bull. 266.
Winston County, June, 1896 (*Underwood*).
South Carolina. South America, Europe, East Asia, Africa, Australia.

Geaster lageniformis Vitt.
Cornell Bull. 23.
Lee County, Auburn, August, 1890 (*Atkinson*).
Ohio.

Geaster limbatus Fr.
Ala. Bull. 266. Cornell Bull. 23.
(*Peters.*)
On the ground in open woods. Lee County, Auburn, February 22, 1891 (*Atkinson*).
Lee County, March, 1896 (*Underwood & Earle*); Winston County, June, 1896 (*Underwood*).
Ohio. Europe, South Africa.

Geaster minimus Schw.
Ala. Bull. 267.
Lee County, February, 1896 (*Underwood & Earle*).
New Jersey.

Geaster saccatus Fr.
Peters coll. Ala. Bull. 267. Cornell Bull. 23.
(*Peters.*) Lee County, Auburn, 1891 (*Atkinson*).
Ohio, New Jersey, New England.

Geaster triplex Jungh.
Cornell Bull. 22.
Shady places. Lee County, Auburn, 1890 (*Atkinson*).
Ohio.

Order NIDULARIALES.

Family NIDULARIACEAE.

NIDULARIA Bull.

Nidularia alabamensis Atkinson.
Cornell Bull. 23.
On decaying wood. Lee County, Auburn, July, 1890 (*Atkinson*).

CRUCIBULUM Tul.

Crucibulum vulgare Tul.
Ala. Bull. 267.
On the ground. Lee County, December, 1895 (*Underwood*); July, 1896 (*Underwood & Earle*).
New Jersey, Ohio. Europe.

CYATHUS Haller.

Cyathus stercoreus (Schw.) Des.
Lee County, March, 1897 (*Earle & Baker*).

Cyathus vernicosus (Bull.) DC.
Cornell Bull. 22.
On charred wood, etc. Lee County, Auburn, 1890 (*Atkinson*).
New Jersey, Ohio. Europe, Africa.

Order SCLERODERMATALES.

Family SCLERODERMATACEAE.

POLYSACCUM DC.

Polysaccum crassipes DC.
Ala. Bull. 268.
Lee County, October, 1895 (*Underwood*); July, 1896 (*Underwood & Earle*).
Europe.

Polysaccum pisocarpum Fr.
Ala. Bull. 268. Cornell Bull. 23.
On the ground in lawns. Lee County, Auburn, 1890 (*Atkinson*); Lee County, July, 1896 (*Underwood & Earle*). Not uncommon.
New Jersey. Europe.

SCLERODERMA Pers.

Scleroderma geaster Fr.
Ala. Bull. 268. Cornell Bull. 23.
On the ground. Lee County, Auburn (*Atkinson*). Lee County, December, 1895 (*Underwood*); July, 1896 (*Underwood & Earle*).
New Jersey.

Scleroderma flavidum E. & E.
Ala. Bull. 26.
Mobile County, December, 1895 (*Underwood*). Lee County, March, 1896 (*Underwood & Earle*); September, December, 1896 (*Earle*).

Scleroderma verrucosum (Bull.) Pers.
Ala. Bull. 268. Cornell Bull. 23.
On the ground. Lee County, Auburn, 1890 (*Atkinson*). Lee County, July, 1896 (*Underwood & Earle*).
On sandy ground. Mobile County (*Earle*).
New Jersey. Europe.

Scleroderma vulgare Hornem.
Ala. Bull. 268. Cornell Bull. 23.
On the ground. Lee County, Auburn (*Atkinson*).
New Jersey, Ohio. Europe.

ASTRAEUS Morgan.

Astraeus hygrometricus (Pers.) Morgan.
Ala. Bull. 266. Cornell Bull. 22, under Geaster.
On the ground in open woods. Lee County, Auburn, February 22, 1891 (*Atkinson*). Lee County, December, 1895 (*Underwood*); Mobile County, November, 1895 (*Underwood*); Winston County, June, 1896 (*Underwood*).
Texas, New Mexico, South Carolina, New Jersey. Europe.

ARACHNION Schw.

Arachnion album Schw.
Cornell Bull. 23.
On the ground. Lee County, Auburn, 1890 (*Atkinson*).
New Jersey.

(FUNGI IMPERFECTI.[1])

Order MONILIALES (Hyphomycetes.)

Family MONILIACEAE (Mucedineae).

MONILIA Pers.

Monilia fructigena Pers.

Ala. Bull. 139. Cornell Bull. 38.
On fruit of *Amygdalus persica*. Lee County, Auburn, July 1, 1892 (*Richards*).
On fruit of *Prunus triflora*. Mobile County (*Mohr*).

Monilia megalosporium (B. & C.) Sacc.

Journ. Linn. Soc. **10**:363, under Oidium. Ala. Bull. 139.
On dead bark.

RHINOTRICHUM Corda.

Rhinotrichum bellum B. & C.

Grevillea, **3**:108. Ala. Bull. 140.
On dead wood (*Beaumont*).

Rhinotrichum macrosporum Farlow.

Ala. Bull. 140. Cornell Bull. 39.
On dead capsules of *Gossypium herbaceum*. Autumn (*Atkinson*).

Rhinotrichum tenellum B. & C.

Ala. Bull. 140. Cornell Bull. 29.
On dead capsules of *Gossypium herbaceum*. Lee County, Auburn, October, 1890 (*Atkinson*).

BOTRYTIS Michx.

Botrytis curta (B. & C.) Sacc.

Grevillea, **3**:110, under Polyactis. Ala. Bull. 138.
On the under side of leaves of *Magnolia* sp. (*Beaumont*).

OVULARIA Sacc.

Ovularia obliqua (Cooke) Oud.

Ala. Bull. 139.
On *Rumex* sp. Lee County, July, 1891 (*Duggar*).

SEPEDONIUM Link.

Sepedonium americanum B. & C.

Peters coll. **1**:123. Ala. Bull. 140.
On rotten wood (*Peters*).

Sepedonium subochraceum B. & C.

Grevillea, **3**:147. Ala. Bull. 140.
On rotten wood (*Peters*). Lee County, July, 1896 (*Underwood & Earle*).

TRICHOTHECIUM Link.

Trichothecium roseum (Pers.) Link.

Ala. Bull. 140. Cornell Bull. 39.
On leaves of *Ficus carica*. Lee County, Auburn, October, 1891 (*Atkinson*).
On leaves of *Amygdalus persica*. Lee County, Auburn, November, 1891 (*Atkinson*).
On carpels of *Gossypium herbaceum*. Lee County, Auburn (*Atkinson*).
Louisiana, New Jersey.

---

[1] The arrangement of this group is practically that of Saccardo's Sylloge Fungorum.

DIDYMARIA Corda.

Didymaria spissa Harkness.

Cornell Bull. 38.

On living leaves of Solidago. Macon County, Shorter, July 16, 1890 (*Atkinson*).

RAMULARIA Unger.

Ramularia areola Atkinson, Bot. Gaz. **15**: 168. 1890.

Ala. Bull. 139. Cornell Bull. 39.

On leaves and bracts of *Gossypium herbaceum*. Lee County, Auburn, September 29, 1890 (*Atkinson*); Macon County, July, 1896 (*Carver*).

Ramularia liriodendri E. & E.

Ala. Bull. 140. Cornell Bull. 38.

On living leaves of Liriodendron. Lee County, Auburn, October, 1889 (*Benton*).

On Liriodendron. Lee County, October, 1895 (*Underwood*).

Macon County (*Carver*).

Ramularia macrospora asteris Trelease.

Ala. Bull. 140.

On *Aster* sp. Lee County, May, 1896 (*Underwood & Earle*).

Ramularia pratensis Sacc.

Cornell Bull. 38.

On leaves of Rumex. Lee County, Auburn, July 20, 1891 (*Duggar*).

Ramularia virgaureae Thuem.

Ala. Bull. 140. Cornell Bull. 39.

On leaves of Solidago. Lee County, Auburn, March 27, 1890 (*Atkinson*).

On *Solidago* sp. Lee County, July, 1891 (*Duggar*).

Europe.

PIRICULARIA Sacc.

Piricularia grisea (Cooke.) Sacc.

Ala. Bull. 139. Cornell Bull. 40.

On leaves of *Paspalum* sp. Lee County, July 11, 1890 (*Atkinson*).

On leaves of *Chaetochloa italica*. Lee County, August, 1890 (*Atkinson*).

On leaves of *Paspalum plicatulum*. Lee County, July 25, 1891 (*Atkinson*).

On leaves of *Syntherisma sanguinale*. Lee County, July 1, 1891 (*Newman*).

On leaves of *Panicum* sp. Lee County, July, 1891 (*Newman*).

SPOROTRICHUM Link.

Sporotrichum globuliferum Speg.

Cornell Bull. 39.

On a dead hymenopterous insect. Lee County, Auburn (*Atkinson*).

OLPITRICHUM Atkinson.

Olpitrichum carpophilum Atkinson.

Cornell Bull. 59.

On dead capsules of *Gossypium herbaceum*. Pike County, Brundidge, September 5, 1891 (*Atkinson*).

CERCOSPORELLA Sacc.

Cercosporella persica Sacc.

Ala. Bull. 138. Cornell Bull. 46.

On leaves of *Amygdalus persica*. Lee County, Auburn, October 30, 1890 (*Atkinson*); October 1, 1891 (*Duggar*). Macon County, August, 1896 (*Carver*).

Cercosporella pycnanthemi Atkinson.

Cornell Bull. 47.

On Koellia. Lee County, Auburn (*Atkinson*).

CHROMOSPORIUM Sacc.

Chromosporium aeruginosum (Corda) Sacc.
Cornell Bull. 38.
On decaying wood. Lee County, Auburn, October, 1889 (*Atkinson*).

Chromosporium fulvum (B. & C.) Sacc.
Journ. Linn. Soc. **10**:355, under Gymnosporium. Ala. Bull. 138.
On *Peziza psammophila* (*Peters*).

Family DEMATIACEAE.

CONIOSPORIUM Link.

Coniosporium arundinellae Ellis & Tracy.
Ala. Bull. 153. Cornell Bull. 39.
On leaves of *Arundinaria tecta*. Lee County, December 25, 1888 (*Newman*).
On dead leaves of *Panicum* sp. Lee County, January, 1890 (*Atkinson*).

Coniosporium arundinis (Corda) Sacc.
Ala. Bull. 153.
On *Saccharum officinarum*. Macon County, July, 1896 (*Carver*).

Coniosporium gramineum E. & E.
Ala. Bull. 153. Cornell Bull. 39.
On culms of *Arundinaria tecta*. Lee County, 1891 (*Atkinson*).

PERICONIA (Tode) Bon.

Periconia pycnospora Fr.
Ala. Bull. 156. Cornell Bull. 41.
On dead stems of *Vigna catjang*. Lee County, Auburn, December, 1890 (*Atkinson*).

STREPTOTHRIX Corda.

Streptothrix atra B. & C.
Grevillea, **3**:107. Ala. Bull. 156.
On Juniperus (*Peters*).
On dead wood. Lee County, November, 1895 (*Underwood*).
Massachusetts, Pennsylvania, South Carolina.

ZYGODESMUS Corda.

Zygodesmus fuscus Corda.
Peters coll. **3**:67. Ala. Bull. 156.
(*Peters.*)

GLENOSPORA B. & C.

Glenospora curtisii Berk. & Desm.
Ala. Bull. 153.
On living bark of Nyssa. Lee County, January, February, 1896 (*Underwood & Earle*).

HARPOCEPHALUM Atkinson.

Harpocephalum dematioides Atkinson.
Cornell Bull. 41.
On leaves of *Cinna arundinacea*. Lee County, Auburn, September 15, 1891 (*Newman*).

FUSICLADIUM Bon.

Fusicladium effusum carpineum E. & E.
Cornell Bull. 40.
On upper surface of leaves of *Carpinus caroliniana*. Lee County, Auburn, October 30, 1891 (*Atkinson*).

Fusicladium pirinum pyracanthae Thuem.

Ala. Bull. 153. Cornell Bull. 40.

On fruit of *Crataegus pyracantha*. Lee County, Auburn, July, September, 1891 (*Duggar & Newman*).

SCOLECOTRICHUM Kunze & Schum.

Scolecotrichum graminis Fkl.

Ala. Bull. 156.

On *Arundinaria tecta*. Lee County, October, 1891 (*Duggar*).

Scolecotrichum euphorbiae Tracy & Earle, Bull. Torr. Club, **23**: 209. 1896

Ala. Bull. 156. Cornell Bull. 40, under Piricularia.

On *Euphorbia nutans*. Lee County, Auburn, August 7, 1891 (*Duggar & Newman*); Lee County, September, 1896 (*Earle*); Macon County, August, 1896 (*Carver*).

POLYTHRINCIUM Kunze & Schum.

Polythrincium trifolii Kunze.

Ala. Bull. 156. Cornell Bull. 40.

On leaves of *Trifolium hybridum*. Lee County, Auburn, February, 1890 (*Edwards*).

On *Trifolium reflexum*. Lee County, May, 1896 (*Underwood & Earle*).

CLADOSPORIUM Link.

Cladosporium fulvum Cooke.

Ala. Bull. 153.

On *Lycopersicum esculentum*, the tomato. Lee County, October, 1896 (*Earle*). Macon County, August, 1896 (*Carver*).

New Jersey, Ohio.

Cladosporium gloeosporoides Atkinson.

Cornell Bull. 39.

On leaves of *Ascyrum stans*. Lee County, Auburn, August 29, 1891 (*Atkinson*).

On stems of *Hypericum mutilum*. Lee County, September 2, 1891 (*Duggar*).

Cladosporium gramineum Corda.

Ala. Bull. 153. Cornell Bull. 39.

On dead leaves of *Avena sativa*. Lee County, Auburn, January 22, 1890 (*Newman*).

On *Chrysopogon avenaceus*. Lee County, September, 1891 (*Duggar*).

Cladosporium herbarum (Pers.) Link.

Ala. Bull. 153.

On mummied fruit of *Ficus carica* (still hanging on tree). Lee County, February, 1896 (*Underwood & Earle*).

New Jersey, Ohio.

Cladosporium xyridis Tracy & Earle.

On withered petals of Xyris. Lee County, September, 1897 (*Earle & Baker*).

Mississippi.

SEPTONEMA Corda.

Septonema spilomeum Berk.

Rav. Fung. Car. Exsic. **4**: 87. Ala. Bull. 156.

On Quercus (*Beaumont*).

HELMINTHOSPORIUM Link.

Helminthosporium avenaceum Curt.

Cornell Bull. 47.

On dead straw of *Avena sativa*. Lee County, Auburn, June 26, 1891 (*Atkinson*).

Helminthosporium beaumontii Sacc.

Grevillea, **3**: 104, as *H. dubium* B. & C. Ala. Bull. 154.

On the under side of leaves, apparently of Viburnum (*Beaumont*).

Helminthosporium flagelloideum Atkinson.

Cornell Bull. 47.

On leaves of *Panicum* sp. Lee County, Auburn, September, 1890 (*Atkinson*).

Helminthosporium inconspicuum C. & E.

Cornell Bull. 47.

On living and languid leaves of *Secale cereale.* Lee County, February 19, 1891 (*Atkinson*).

Louisiana, New Jersey.

Helminthosporium leersiae Atkinson.

Ala. Bull. 154. Cornell Bull. 47.

On leaves of *Homalocenchrus virginicus.* Lee County, Auburn, September 13, 1891 (*Atkinson*).

Helminthosporium macrocarpum Grev.

Ala. Bull. 154. Cornell Bull. 47.

On dead twigs of Quercus. Lee County, Auburn, November 8, 1891 (*Atkinson*).

On dead twigs. Lee County, February, 1896 (*Underwood & Earle*).

New Jersey.

Helminthosporium macrocarpum caudatum B. & Br.

Ala. Bull. 154.

On dead twigs. Lee County, January, 1896 (*Underwood & Earle*)

Helminthosporium ravenelii B. & C.

Ala. Bull. 154. Cornell Bull. 47.

On inflorescence of *Sporobolus indicus.* Lee County, Auburn, June, 1890 (*Atkinson*); Macon County, October, 1896 (*Carver*).

Louisiana. Cuba.

Helminthosporium tuberosum Atkinson.

Cornell Bull. 47.

On putrescent culms of *Secale cereale.* Lee County, Auburn, September, 1891 (*Newman*).

Helminthosporium turcicum Pass.

Ala. Bull. 154. Cornell Bull. 47.

On languid leaves of *Sorghum halepense.* Mobile County, July 24, 1890 (*Atkinson*).

On *Cinna arundinacea.* Lee County, Auburn, September 15, 1891 (*Atkinson*).

On *Elymus* sp. July 5, 1890 (*Atkinson*).

CERCOSPORA Fr.

Cercospora acalyphae Peck.

Ala. Bull. 141. Cornell Bull. 43.

On leaves and stems of *Acalypha ostryaefolia.* Lee County, August 6, September 12, 1891 (*Newman*).

Cercospora agrostidis Atkinson, Journ. Elisha Mitch. Soc. **8**:44. 1892.

Ala. Bull. 141. Cornell Bull. 43.

On leaves of Agrostis. Lee County, Auburn, July 23, 1891 (*Duggar & Newman*)

Cercospora ageratoides E. & E.

On *Eupatorium rotundifolium.* Lee County, October, 1896 (*Earle*).

Cercospora alabamensis Atkinson, Journ. Elisha Mitch. Soc. **8**:51. 1892.

Ala. Bull. 141. Cornell Bull. 43.

On leaves of *Ipomoea purpurea.* Dallas County, Uniontown, July 12, 1890 (*Atkinson*); Lee County, August, 1891 (*Newman*); Macon County, August, 1896 (*Carver*).

Cercospora althaeina Sacc.

Ala. Bull. 141. Cornell Bull. 45.

On *Althaea rosea.* Dallas County, Uniontown, July 12, 1890 (*Atkinson*).

Cercospora althaeina modiolae Atkinson, Journ. Elisha Mitch. Soc. **8**:60. 1892.

Ala. Bull. 141. Cornell Bull. 45.

On leaves of *Modiola multifida.* Lee County, Auburn, 1890 (*Atkinson*).

Cercospora anthelmintica Atkinson, Journ. Elisha Mitch. Soc. **8**:49. 1892.

Ala. Bull. 141. Cornell Bull. 43.

On leaves of *Chenopodium anthelminticum.* Lee County, Auburn, August 27, 1891 (*Duggar*).

Cercospora asterata Atkinson, Journ. Elisha Mitch. Soc. **8**:50. 1892.

Ala. Bull. 142. Cornell Bull. 43.

On leaves of *Aster* sp. Lee County, Auburn, November 25, 1891 (*Atkinson*).

Cercospora atromaculans E. & E.

Ala. Bull. 142. Cornell Bull. 44.
On leaves of *Cassia tora*. Lee County, Auburn, September 10, 1890 (*Atkinson*).
On *Cassia occidentalis*. Lee County, October, 1895 (*Underwood*).

Cercospora atromarginalis Atkinson.

Ala. Bull. 142. Cornell Bull. 45.
On leaves of *Solanum nigrum*. Lee County, Auburn, 1890 (*Atkinson*).

Cercospora avicularis Wint.

Ala. Bull. 142. Cornell Bull. 43.
On *Polygonum punctatum*. Lee County, August, 1891 (*Atkinson*).

Cercospora avicularis sagittati Atkinson, Journ. Elisha Mitch. Soc. 8:48. 1892.

On leaves of *Polygonum sagittatum*. Lee County, October 1, 1891 (*Duggar*).

Cercospora beticola Sacc.

Ala. Bull. 143. Cornell Bull. 43.
On leaves of *Beta vulgaris*, the sugar beet. Lee County, Auburn, November 28, 1890 (*Atkinson*).
Ohio.

Cercospora bolleana (Thuem.) Speg.

Ala. Bull. 143. Cornell Bull. 45.
On *Ficus carica*. Lee County, Auburn, September 4, 1890 (*Atkinson*); October, 1896 (*Earle*).
Mississippi.

Cercospora boehmeriae Peck.

Ala. Bull. 143. Cornell Bull. 44.
On *Boehmeria cylindrica*. Lee County, Auburn, November 7, 1891 (*Atkinson*); Macon County, Shorter, July 16, 1890 (*Atkinson*).

Cercospora canescens E. & M.

Ala. Bull. 143.
On *Phaseolus vulgaris*. Lee County, July, 1891 (*Newman*).
Louisiana, New Jersey.

Cercospora catenospora Atkinson.

Ala. Bull. 143. Cornell Bull. 46.
On *Sambucus canadensis*. Lee County, August 27, October, 1891 (*Atkinson*).

Cercospora cephalanthi E. & K. Journ. Elisha Mitch. Soc. 8:67. 1892.

Ala. Bull. 143. Cornell Bull. 46.
On leaves of *Cephalanthus occidentalis* (*Atkinson*).
Louisiana.

Cercospora cerasella Sacc.

Ala. Bull. 143. Cornell Bull. 42.
On leaves of *Prunus avium*. Lee County, Auburn, July 13, 1891 (*Newman*); Gold Hill, September, 1890 (*Atkinson*).
Europe.

Cercospora cercidicola Ell.

Ala. Bull. 143. Cornell Bull. 42.
On leaves of *Cercis canadensis*. Lee County, Auburn, August 7, 1891 (*Newman & Duggar*); Hale County, May, 1896 (*Underwood*).

Cercospora citrullina Cooke.

Ala. Bull. 143. Cornell Bull. 43.

On *Citrullus vulgaris*, the watermelon. Lee County, Auburn, September 3, 1890 (*Atkinson*).

Cercospora clitoriae Atkinson, Journ. Elisha Mitch. Soc. 8:62. 1892.

Ala. Bull. 143. Cornell Bull. 45.
On *Clitoria mariana*. Lee County, Auburn, August 29, 1891 (*Atkinson*).

Cercospora clavata (Ger.) Cooke.

Cornell Bull. 42.
On leaves of *Asclepias obtusifolia*. Lee County, Auburn, August 19, 1892 (*Richards*).

Cercospora consociata Winter.
Ala. Bull. 144.
On *Ruellia ciliosa*. Lee County, July, 1896 (*Underwood & Earle*).

Cercospora crinospora Atkinson.
Ala. Bull. 144. Cornell Bull. 45.
On *Rynchospora glomerata*. Lee County, Auburn, August 27, 1891 (*Atkinson*).

Cercospora crotonifolia Cooke.
Cornell Bull. 42.
On leaves of *Croton* sp. Lee County, Auburn, October 16, 1889 (*Atkinson*).

Cercospora cruciferarum E. & E.
Cornell Bull. 42.
On *Brassica oleracea*. Lee County, Auburn, August 29, 1892 (*Richards*).

Cercospora cruenta Sacc.
Ala. Bull. 144. Cornell Bull. 44.
On *Vigna catjang*. Lee County, Auburn, July 8, 1890 (*Duggar*); Macon County, October, 1896 (*Carver*); Perry County, July, 1891 (*Atkinson*).

Cercospora cucurbitae E. & C.
Ala. Bull. 144. Cornell Bull. 43.
On *Luffa acutangula*, the dish-rag squash. Lee County, 1890 (*Atkinson*).
On *Lagenaria vulgaris*, the common gourd. Lee County, Auburn, September 10, 1891 (*Duggar*).

Cercospora depazeoides (Desm.) Sacc.
Ala. Bull. 144. Cornell Bull. 45.
On leaves of *Sambucus canadensis*. Lee County, Auburn, September 9, 1890 (*Atkinson*).
Louisiana.

Cercospora desmodii E. & K.
Ala. Bull. 144. Cornell Bull. 44.
On *Meibomia mollis* (?). Lee County, 1890 (*Atkinson*).
On *Meibomia* sp. Perry County, Uniontown, July 12, 1890 (*Atkinson*).
Mississippi, Ohio.

Cercospora diodiae Cooke.
Ala. Bull. 144. Cornell Bull. 42.
On leaves of *Diodia teres*. Lee County, Auburn, July 16, 1891 (*Duggar & Newman*).
New Jersey.

Cercospora diodiae-virginianae Atkinson, Journ. Elisha Mitch. Soc. **8**: 58. 1892.
Ala. Bull. 144. Cornell Bull. 44.
On leaves of *Diodia virginiana*. Lee County, Auburn, September 26, 1891 (*Duggar*).

Cercospora diospyri Thuem.
Ala. Bull. 145. Cornell Bull. 45.
On leaves of *Diospyros virginiana*. Lee County, Auburn, September 26, 1891 (*Duggar*).

Cercospora effusa (B. & C.) Ellis.
Ala. Bull. 145. Cornell Bull. 45.
On leaves of *Lobelia amoena*. Lee County, Auburn, October 11, November 3, 1891 (*Atkinson*).
Ohio.

Cercospora elephantopodis E. & E.
Cornell Bull. 44.
On leaves of *Elephantopus tomentosus*. Lee County, Auburn, June 30, 1890 (*Atkinson*).
Mississippi.

Cercospora erechtitis Atkinson, Journ. Elisha Mitch. Soc. **8**: 66. 1892.
Ala. Bull. 145. Cornell Bull. 46.
On leaves of *Erechtites hieracifolia*. Lee County, November 5, 1891 (*Duggar*).

Cercospora erythrogena Atkinson, Journ. Elisha Mitch. Soc. **8**: 65. 1892.
Ala. Bull. 145. Cornell Bull. 46.
On leaves of *Rhexia mariana*. Lee County, July 22, 1890 (*Atkinson*).
On *Rhexia virginica*. Lee County, October, 1890 (*Atkinson*); August 29, 1891 (*Atkinson*).

Cercospora euphorbiaecola Atkinson.
Cornell Bull. 41.
On leaves of *Euphorbia*. Lee County, Auburn, August 16, 1892 (*Richards*).

Cercospora flagellaris E. & M.
Ala. Bull. 145. Cornell Bull. 43.
On leaves of *Phytolacca decandra*. Lee County, Auburn, July 11, 1891 (*Newman*).

Cercospora flagellifera Atkinson, Journ. Elisha Mitch. Soc. **8**:51. 1892.
Ala. Bull. 145. Cornell Bull. 43.
On *Galactia volubilis*. Lee County, Auburn, September 9, 1891 (*Atkinson*).

Cercospora fuscovirens Sacc.
Ala. Bull. 146. Cornell Bull. 45.
On leaves of *Passiflora incarnata*. Lee County, Auburn, October 2, 1891 (*Duggar*).

Cercospora fusimaculans Atkinson, Journ. Elisha Mitch. Soc. **8**:50. 1892.
Ala. Bull. 146. Cornell Bull. 43.
On leaves of *Panicum dichotomum*. Lee County, Auburn, August 15, 1891 (*Duggar*).

Cercospora galii E. & Holw.
Ala. Bull. 146. Cornell Bull. 42.
On *Galium pilosum puncticulosum*. Lee County, Auburn, July 22, 1890 (*Atkinson*).
On *Galium* sp. (*Atkinson*).

Cercospora gnaphaliacea Cooke (?).
Bull. Torr. Club, **25**:366. 1898.
On *Gnaphalium purpureum*. Lee County, Auburn, February 21, 1897 (*Earle & Baker*).

Cercospora gossypina Cooke.
Ala. Bull. 146. Cornell Bull. 46.
On the leaves, bracts, and cotyledons of *Gossypium herbaceum*, the cotton plant. Lee County, October, 1890 (*Atkinson*). Common throughout the State.
The conidial stage of *Mycosphaerella gossypina*.

Cercospora hydrangeae E. & E.
Ala. Bull. 146. Cornell Bull. 44.
On leaves of a cultivated species of Hydrangea. Lee County, Auburn, 1890 (*Atkinson*).

Cercospora hydrocotyles E. & E.
Ala. Bull. 146. Cornell Bull. 44.
On leaves of *Hydrocotyle umbellata*. Macon County, Shorter, July 16, 1890 (*Atkinson*); Lee County, August, 1891 (*Duggar*).
Louisiana.

Cercospora jatrophae Atkinson, Journ. Elisha Mitch. Soc. **8**:64. 1892.
Ala. Bull. 146. Cornell Bull. 45.
On leaves of *Jatropha stimulosa*. Lee County, Auburn, July 2, 1890 (*Atkinson*).

Cercospora jussiaeae Atkinson, Journ. Elisha Mitch. Soc. **8**:50. 1892.
Ala. Bull. 147. Cornell Bull. 43.
On leaves of *Jussiaea leptocarpa*. Lee County, Auburn, September 2, 1891 (*Duggar*).
On leaves of *Jussiaea decurrens*. Lee County, Auburn, September 29, 1891 (*Atkinson*).

Cercospora leucosticta E. & E.
Ala. Bull. 147.
On *Melia azedarach*. Lee County, November, 1895 (*Underwood*).

Cercospora liquidambaris C. & E.
Ala. Bull. 147. Cornell Bull. 43.
On leaves of *Liquidambar styraciflua*. Lee County, Auburn, October 14, 1891 (*Atkinson*). Macon County, October, 1896 (*Carver*).

Cercospora lobeliae K. & S.
Ala. Bull. 147. Cornell Bull. 43.
On leaves of *Lobelia amoena*. Lee County, Auburn, October 14, 1891 (*Atkinson*).

Cercospora ludwigiae Atkinson, Journ. Elisha Mitch. Soc. **8**:58. 1892.
Ala. Bull. 147. Cornell Bull. 44.
On leaves of *Ludwigia alternifolia*. Lee County, Auburn, September 29, 1891 (*Atkinson*).

Cercospora lycopi E. & E.
Cornell Bull. 42.
On leaves of *Lycopus rubellus*. Lee County, Auburn, September 2, 1891 (*Duggar*).

Cercospora macroguttata Atkinson, Journ. Elisha Mitch. Soc. **8**:64. 1892.
Ala. Bull. 147. Cornell Bull. 45.
On leaves of *Chrysopsis graminifolia*. Lee County, Auburn, July 13, 1891 (*Atkinson*).

Cercospora mali E. & E.
Ala. Bull. 148. Cornell Bull. 44.
On leaves of *Malus malus*. Lee County, Gold Hill, September, 1890 (*Atkinson*).

Cercospora mikaniae E. & E.
On *Willughbya scandens*. Lee County, September, 1897 (*Earle & Baker*).

Cercospora moricola Cooke.
Ala. Bull. 148. Cornell Bull. 41.
On *Morus rubra*. Lee County, Auburn, July 22, 1890 (*Atkinson*).

Cercospora muhlenbergiae Atkinson.
Cornell Bull. 46.
On leaves of *Muhlenbergia diffusa*. Lee County, Auburn, October 3, 1891 (*Atkinson*).

Cercospora nymphaeae E. & E.
Ala. Bull. 148. Cornell Bull. 44.
On leaves of *Castalia* (*Nymphaea*) *odorata*. Lee County, Auburn, September 2, 1891 (*Duggar*).
Macon County, October, 1896 (*Carver*).
New Jersey.

Cercospora occidentalis Cooke.
Ala. Bull. 148. Cornell Bull. 42.
On leaves of *Cassia occidentalis*. Lee County, Auburn, September, 1891 (*Duggar*).
Macon County, October, 1896 (*Carver*).

Cercospora omphacodes E. & Hol.
Ala. Bull. 148. Cornell Bull. 42. Bull. Torr. Club, **25**:366.
On *Phlox floridana*. Lee County, Auburn, June 23, 1890 (*Atkinson*).
On *Phlox maculata*. Chambers County, June 22, 1897 (*Earle*).
Europe.

Cercospora oenotherae-sinuatae Atkinson.
Cornell Bull. 46.
On *Oenothera laciniata*. Lee County, Auburn, September 4, 1890 (*Atkinson*).

Cercospora pachyspora E. & E.
Ala. Bull. 148. Cornell Bull. 43.
On leaves of *Peltandra sagittaefolia*. Lee County, Auburn, September 26, 1891 (*Atkinson*).

Cercospora pentstemonis E. & K.
Ala. Bull. 148. Cornell Bull. 42.
On leaves of *Pentstemon hirsutus*. Lee County, Auburn, April 27, 1892 (*Atkinson*).

Cercospora personata (B. & C.) Ell.
Rav. Fung. Car. Exsic. **3**:85, under Cladosporium. Ala. Bull. 148. Cornell Bull. 42.
On leaves of *Arachis hypogaea*. (*Beaumont*). Lee County, Auburn, September 7, 1891 (*Atkinson*).

Cercospora petersii (B. & C.) Atkinson.
Grevillea, **3**:102, under Helminthosporium. Ala. Bull. 149. Cornell Bull. 44.
North Alabama (*Peters*).
On leaves of *Smilax glauca*. Macon County, Shorter, July 16, 1890 (*Atkinson*); Lee County, Auburn, December 20, 1891 (*Atkinson*).
On *Smilax laurifolia*. Lee County, March, 1896 (*Underwood & Earle*).

Cercospora pinnulaecola Atkinson, Journ. Elisha Mitch. Soc. **8**:64. 1892.
Ala. Bull. 149. Cornell Bull. 46.
On *Cassia multipinnata*, mistakenly reported as *C. nictitans*. Lee County, Auburn, October 1, 1891 (*Duggar*).

Cercospora polygonacea E. & E.

Ala. Bull. 149. Cornell Bull. 43.
On leaves of *Polygonum scandens*. Lee County, Auburn, October 14, 1891 (*Duggar*).

Cercospora purpurea Cooke.

Ala. Bull. 149.
On *Persea palustris*. Lee County, April, 1896 (*Underwood & Earle*).
Louisiana, Mississippi.

Cercospora rhuina C. & E.

Ala. Bull. 149. Cornell Bull. 43.
On *Rhus toxicodendron*. Lee County, Auburn, June 30, 1890 (*Atkinson*).
On *Rhus glabra*. Lee County, Auburn, August 7, 1891 (*Duggar & Newman*).
On *Rhus copallina*. Lee County, Auburn, June 30, 1890 (*Atkinson*); Lee County, November, 1895 (*Underwood*).
On *Rhus vernix*. Macon County, Shorter, July 16, 1890 (*Atkinson*).

Cercospora ribis Earle, Bull. Torr. Club, **25**:366. 1898.

On leaves of a cultivated gooseberry, *Ribes* sp. Lee County, Auburn, July 18, 1896 (*Underwood & Earle*).

Cercospora richardiaecola Atkinson, Journ. Elisha Mitch. Soc. **8**:51. 1892.

Ala. Bull. 150. Cornell Bull. 43.
On leaves of *Richardia africana*. Lee County, Auburn, September 7, 1891 (*Atkinson*).

Cercospora rigospora Atkinson, Journ. Elisha Mitch. Soc. **8**:65. 1892.

Ala. Bull. 150. Cornell Bull. 46.
On leaves of *Solanum nigrum*. Lee County, Auburn, July 5, 1890 (*Atkinson*).

Cercospora rubi Sacc.

Ala. Bull. 150. Cornell Bull. 44.
On leaves of *Rubus cuneifolius*. Lee County, Auburn, August, 1890 (*Atkinson*).

Cercospora sagittariae E. & K.

Ala. Bull. 150. Cornell Bull. 45.
On leaves of *Sagittaria latifolia*. Lee County, Auburn, July 24, 1891 (*Duggar & Newman*).

Cercospora saururi E. & E.

Ala. Bull. 150. Cornell Bull. 44.
On leaves of *Saururus cernuus*. Macon County, Shorter, July 16, 1890 (*Atkinson*).

Cercospora scolecotrichoides Atkinson.

Cornell Bull. 46.
On languid leaves of *Arundinaria tecta*. Lee County, Auburn, October 28, 1891 (*Duggar*).

Cercospora seriata Atkinson, Journ. Elisha Mitch. Soc. **8**:59. 1892.

Ala. Bull. 151. Cornell Bull. 45.
On leaves of *Sporobolus asper*. Lee County, Auburn, July 24, August 7, 1891 (*Duggar & Newman*).

Cercospora setariae Atkinson, Journ. Elisha Mitch. Soc. **8**:50. 1892.

Ala. Bull. 151. Cornell Bull. 43.
On leaves of *Chaetochloa glauca*. Lee County, Auburn, September 17, 1891 (*Duggar*).

Cercospora silphii E. & E.

Ala. Bull. 151. Cornell Bull. 45.
On leaves of *Silphium compositum*. Lee County, Auburn, June 30, 1890 (*Atkinson*).

Cercospora smilacina Sacc. (?)

Ala. Bull. 151.
On *Smilax* sp. Lee County, May, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, Ohio.

Cercospora solanicola Atkinson, Journ. Elisha Mitch. Soc. **8**:53. 1892.

Ala. Bull. 151. Cornell Bull. 44.
On leaves of *Solanum tuberosum*. Lee County, Auburn, June 19, 1891 (*Atkinson*).

Cercospora sordida Sacc.

Ala. Bull. 151. Cornell Bull. 45.
On leaves of *Tecoma radicans*. Lee County, Auburn, September 26, 1891 (*Duggar*).
Mississippi.

Cercospora sorghi E. & E.

Ala. Bull. 151. Cornell Bull. 41.
On leaves of *Sorghum halepense*. Montgomery County, September 8, 1891 (*Atkinson*); Macon County, August, 1896 (*Carver*).

Cercospora stylismae Tracy & Earle.

Ala. Bull. 151.
On *Breweria humistrata*. Lee County, July, 1896 (*Underwood & Earle*).
Mississippi.

Cercospora tephrosiae Atkinson, Journ. Elisha Mitch. Soc. **8**:44. 1892.

Ala. Bull. 151. Cornell Bull. 42.
On *Cracca* (*Tephrosia*) *hispidula*. Lee County, Auburn, September 14, 1891 (*Atkinson*).

Cercospora tessellata Atkinson, Journ. Elisha Mitch. Soc. **8**:59. 1892.

Ala. Bull. 152. Cornell Bull. 45.
On *Dactyloctenium aegyptium*. Lee County, November 6, 1891 (*Atkinson*).

Cercospora thaspii E. & E.

Ala. Bull. 152. Cornell Bull. 45.
On *Angelica villosa*. Lee County, Auburn, July 22, 1890; July 23, 1891 (*Duggar & Newman*).

Cercospora tropaeoli Atkinson, Journ. Elisha Mitch. Soc. **8**:59. 1892.

Ala. Bull. 152. Cornell Bull. 45.
On a cultivated species of Tropaeolum. Lee County, Auburn, September 7, 1891 (*Atkinson*).

Cercospora truncatella Atkinson, Journ. Elisha Mitch. Soc. **8**:44. 1892.

Ala. Bull. 152. Cornell Bull. 42.
On leaves of *Passiflora incarnata*. Lee County, Auburn, August 26, 1891 (*Atkinson*).

Cercospora tuberosa E. & K.

Ala. Bull. 152.
On *Apios apios*. Macon County, August, 1896 (*Carver*).

Cercospora verbenaecola E. & E.

Cornell Bull. 44.
On leaves of cultivated species of Verbena. Lee County, Auburn, December 24, 1891 (*Atkinson*).
Louisiana.

Cercospora vernoniae E. & K.

Ala. Bull. 152. Cornell Bull. 41.
On leaves of *Vernonia noveboracensis*. Lee County, August 29, 1891 (*Atkinson*).
On leaves of *Vernonia angustifolia*. Lee County, Auburn, August 16, 1892 (*Richards*).

Cercospora violae Sacc.

Ala. Bull. 153. Cornell Bull. 44.
On leaves of *Viola odorata*. Lee County, Auburn, July 25, 1891 (*Atkinson*).
On *Viola villosa*. Lee County, May, 1892 (*Duggar*).
Mississippi, Ohio.

Cercospora viticola (Ces.) Sacc.

Ala. Bull. 153. Cornell Bull. 44.
On the leaves of cultivated species of Vitis, the grape. Lee County, Auburn, 1891 (*Atkinson*).

Cercospora yuccae Cooke.

Cornell Bull. 41.
On leaves of Yucca (*Atkinson*).

Cercospora zinniae E. & M.

Ala. Bull. 153. Cornell Bull. 42.
On leaves of *Zinnia multiflora*. Lee County, Auburn, summer, 1890 (*Atkinson*).

HETEROSPORIUM Klotzsch.

Heterosporium gracile (Wallr.) Sacc.

Cornell Bull. 47.
On leaves of *Iris* sp., in cultivation. August 1, 1891 (*Duggar*).

Heterosporium interseminatum (B. & Br.) Atkinson.

Ala. Bull. 154, as *Heterosporium sambuci* Earle, and *Helminthosporium interseminatum* B. & Br. Cornell Bull. 48.

On *Solidago canadensis*. Lee County, September, 1891 (*Atkinson*).

On *Sambucus canadensis*. Lee County, November, 1891 (*Atkinson*); March, 1896 (*Earle*).

SPORODESMIUM Link.

Sporodesmium quadratum Atkinson.

Cornell Bull. 40.

On leaves of *Crataegus* sp. Montgomery County, Highland Park, October 10, 1891 (*Atkinson*).

TETRAPLOA Berk. & Br.

Tetraploa divergens Tracy & Earle.

Cornell Bull. 48.

On leaves of *Panicum elongatum*. Lee County, Auburn, October 15, 1891 (*Atkinson*).

Tetraploa ellisii Cooke.

Cornell Bull. 48.

On culms of *Arundinaria tecta*. Lee County, Auburn, September 19, 1891 (*Duggar*). Louisiana, New Jersey.

MACROSPORIUM Fr.

Macrosporium antennaeforme B. & C.

Grevillea, **3**:105. Ala. Bull. 155.

On leaves of Celtis (*Peters*).

Macrosporium brassicae Berk.

Ala. Bull. 155.

On *Brasssica oleracea*, the cabbage. Washington County, July, 1896 (*Underwood*).

Macrosporium catalpae E. & M.

Ala. Bull. 155.

On *Catalpa catalpa*. Macon County, October, 1896 (*Carver*).

Macrosporium cheiranthi (Lib.) Fr.

Grevillea, **3**:105. Ala. Bull. 155.

On *Rosa* sp. (*Beaumont*).

Macrosporium cookei Sacc.

Ala. Bull. 155. Cornell Bull. 40.

On leaves of *Datura stramonium*. Lee County, Auburn, August, 1891 (*Duggar*).

Macrosporium iridis C. & E.

Ala. Bull. 155.

On *Iris* sp. Lee County, August, 1891 (*Duggar*).

New Jersey.

Macrosporium leguminum Cooke.

Ala. Bull. 155.

On pods of *Vigna catjang*. Macon County, August, 1896 (*Carver*).

Macrosporium pirorum Cooke.

Cornell Bull. 40.

On leaves of *Pyrus communis*. Montgomery County, Mathews, June 17, 1891 (*Atkinson*).

Macrosporium nigricantium Atkinson, Bot. Gaz. **16**:62. 1891.

Ala. Bull. 155. Cornell Bull. 40.

On leaves of *Gossypium herbaceum*, the cotton plant. Lee County, 1891 (*Atkinson*); Macon County, August, 1896 (*Carver*). In various parts of the State.

Macrosporium ravenelii Thuem.

Ala. Bull. 155.

On *Meibomia mollis*. Lee County, March, 1896 (*Underwood & Earle*).

Macrosporium solani E. & M.
Cornell Bull. 40.
On decaying red peppers; *Capsicum annuum*. Lee County, Auburn, summer, 1890 (*Atkinson*).
Louisiana, New Jersey.

Macrosporium sarcinula Berk.
Cornell Bull. 40.
On decaying fruit of *Citrullus vulgaris*. Lee County, Auburn, January 20, 1892 (*Atkinson*).

Macrosporium stilbosporoideum B. & C.
Grevillea, 3:105. Ala. Bull. 156.
On leaves of *Crataegus* sp. (*Beaumont*).

TRIPOSPORIUM Corda.

Triposporium elegans Corda.
Cornell Bull. 48.
On leaves of *Rubus argutus*. Lee County, Auburn, October 30, 1891 (*Atkinson*).

STYSANUS Corda.

Stysanus stemonites (Pers.) Corda.
Cornell Bull. 48.
On decaying rose leaves. Lee County, Auburn, June, 1890 (*Atkinson*).

Family STILBACEAE.

STILBUM Tode.

Stilbum arcticum Berk.
Cornell Bull. 48.
On dead *Stereum versicolor*. Lee County, Auburn (*Atkinson*).

Stilbum versicolor Pat.
Cornell Bull. 48.
On bird dung. Lee County, Auburn, August 14, 1890 (*Atkinson*).

ISARIA Pers.

Isaria radiata B. & C.
Grevillea, 3:62. Ala. Bull. 156.
On pine wood (*Peters*).

Isaria verticillata Atkinson.
Cornell Bull. 48.
On underside of leaves of *Quercus minor*. Lee County, Auburn, November 11, 1891 (*Duggar*).

ISARIOPSIS Fr.

Isariopsis linderae (E. & E.) Sacc.
Peters coll. 142, as *Helminthosporium petersii* B. & C. Ala. Bull. 157.
On *Benzoin benzoin* (*Peters*).

Family TUBERCULARIACEAE.

TUBERCULARIA Tode.

Tubercularia ailanthi Cooke.
Ala. Bull. 159.
On *Juglans regia*. Lee County, January, 1896 (*Underwood & Earle*).
On *Melia azedarach*. Lee County, January, 1896 (*Underwood & Earle*).
On *Ficus carica*. Lee County, January, 1896 (*Underwood & Earle*).

Tubercularia vulgaris Tode (?).
Ala. Bull. 159.
On *Morus* sp., in cultivation. Lee County, January, 1896 (*Underwood & Earle*).
Louisiana, New Jersey, Ohio.

ILLOSPORIUM Mart.

Illosporium minimum E. & E. Proc. Acad. Nat. Sci. Phila. **1893**: 465. 1894.
Ala. Bull. 159.
On rotten wood (*Atkinson*).

SPHACELIA Lév.

Sphacelia tripsaci Bornet.
Cornell Bull. 48.
On *Tripsacum dactyloides*. Hale County, Gallion, September 20, 1894 (*Duggar*).

VOLUTELLA Tode.

Volutella acalyphae Atkinson.
Cornell Bull. 49.
On stems of *Acalypha ostryaefolia*. Lee County, Auburn, September 12, 1891 (*Newman*).

Volutella oxyspora Atkinson.
Cornell Bull. 50.
On decaying cultivated beet. Lee County, Auburn, December, 1890 (*Atkinson*).

Volutella setosa (Grev.) Berk.
Ala. Bull. 160. Cornell Bull. 49.
On dead stems of various plants. Lee County, Auburn, 1891 (*Atkinson*).

Volutella tectaecola Atkinson.
Cornell Bull. 49.
On leaves of *Arundinaria tecta*. Lee County, Auburn, August 15, 1891 (*Duggar*).

FUSARIUM Link.

Fusarium alabamense Sacc.
Grevillea, **3**: 98, as *F. erubescens*. Ala. Bull. 157.
On dead bark (*Beaumont*).

Fusarium cinnabarium (B. & C.) Sacc.
Rav. Fung. Car. Exsic. **3**: 80. Grevillea **3**: 146, under Fusisporium. Ala. Bull. 157.
On *Acer negundo* (*Peters*).
On *Carpinus caroliniana* (*Peters*).

Fusarium graminum Corda.
Cornell Bull. 49.
In seeds and glumes of living *Paspalum dilatatum*. Lee County, Auburn, November, 1890 (*Atkinson*).

Fusarium helotioides B. & C.
Grevillea, **3**: 98. Ala. Bull. 157.
On *Ilex decidua* (*Peters*).

Fusarium marginatum B. & C.
Grevillea, **3**: 97. Ala. Bull. 158.
On stems of *Smilax* sp. (*Beaumont*).

Fusarium miniatum (B. & C.) Sacc.
Grevillea **3**: 147. Ala. Bull. 158.
On pine wood (*Peters*).
On *Vitis rotundifolia*. Lee County, March, 1896 (*Underwood & Earle*).

Fusarium oxysporum Schlecht.
Cornell Bull. 49.
On bolls of *Gossypium herbaceum*. Common (*Atkinson*).
On bark of *Melia azedarach*. Common (*Atkinson*).

Fusarium oxysporum lycopersici Sacc.

Cornell Bull. 49.

On internal portions of fruit of Lycopersicum, the tomato. Lee County, Auburn, 1890 (*Atkinson*).

Fusarium roseum Link.

Cornell Bull. 49.

On staminate aments of *Alnus rugosa*. Lee County, Auburn, January, 1890 (*Atkinson*).

Louisiana, New Jersey.

Fusarium sarcochroum (Desm.) Sacc.

Ala. Bull. 158.

On *Melia azedarach*. Lee County, August, 1891 (*Newman*)

Louisiana.

Fusarium solani Mar.

Ala. Bull. 158. Cornell Bull. 48.

On dead tubers of *Solanum tuberosum*. Limestone County, Athens, 1890 (*Newman*).

Fusarium ustilaginis K. & S.

Cornell Bull. 49.

On *Ustilago avenae*. Lee County, Auburn, 1891 (*Atkinson*).

Fusarium vasinfectum Atkinson, Bull. Ala. Agr. Exper. Sta. **41**:28. 1892.

Ala. Bull. 158. Cornell Bull. 48.

In vascular ducts of stems of *Gossypium herbaceum*, the cotton plant. Lee County, July, 1891 (*Atkinson*).

In *Hibiscus esculentus* (*Atkinson.*)

The conidial stage of *Neocosmospora vasinfecta*.

MICROCERA Desm.

Microcera coccophila Desm.

Ala. Bull. 159. Cornell Bull. 49.

On *Aspidiotus obscurus*, on living branches of *Quercus nigra* (*Q. aquatica*). Lee County, Auburn, November 12, 1891 (*Atkinson*).

MYROTHECIUM Tode.

Myrothecium verrucaria (Alb. & Schw.) Ditm.

Grevillea, **3**:99. Ala. Bull. 159.

On grass (*Beaumont*).

New Jersey.

EPICOCCUM Link.

Epicoccum neglectum Desm.

Cornell Bull. 49.

On dead leaves of *Avena sativa*, and other hosts. Lee County, Auburn (*Atkinson*)

Louisiana, New Jersey.

Epicoccum vulgare Corda.

Cornell Bull. 49.

On dead portions of leaves of Elymus. Lee County, Auburn, July 5, 1890 (*Atkinson*).

SPEGAZZINIA Sacc.

Spegazzinia tessarthra (B. & C.) Sacc.

Ala. Bull. 159.

On *Saccharum officinarum*. Macon County, August, 1896 (*Carver*).

Spegazzinia tricophila Atkinson.

Cornell Bull. 49.

On leaves of *Rubus argutus* (*R. villosus*). Lee County, Auburn (*Atkinson*).

CEREBELLA Ces.

Cerebella andropogonis Ces.

Ala. Bull. 207.
On *Erianthus contortus*. Macon County, August, 1896 (*Carver*).

Cerebella paspali Cooke & Mass.

Ala. Bull. 207. Cornell Bull. 49.
On *Paspalum compressum*. Lee County, Auburn, August, 1891 (*Atkinson*); Macon County, October, 1896 (*Carver*).

Cerebella sorghi Tracy & Earle, Bull. Torr. Club, **26**:494. 1899.

Ala. Bull. 207, as *C. andropogonis* (in part).
On *Chrysopogon avenaceus*. Macon County, August, 1896 (*Carver*).

Order MELANCONIALES.

Family MELANCONIACEAE.

GLOEOSPORIUM Desm. & Mont.

Gloeosporium fructigenum Berk.

Ala. Bull. 161. Cornell Bull. 37, as *G. ampelophagum* (Pass.) Sacc.
On *Malus malus*. Lee County, August, 1891 (*Atkinson*).
On cultivated species of Vitis, the grape. Lee County, Auburn (*Atkinson*); Washington County, July, 1896 (*Earle*).

Gloeosporium fusarioides E. & K.

Cornell Bull. 36.
On living leaves of *Asclepias* sp. Lee County, Auburn (*Atkinson*).

Gloeosporium lagenarium foliicolum E. & E.

Ala. Bull. 161.
On *Citrullus vulgaris*. Washington County, July, 1896 (*Earle*).

Gloeosporium quercinum West.

Cornell Bull. 37.
On leaves of Quercus. Lee County, Auburn, September 4, 1890 (*Atkinson*).

Gloeosporium septorioides Sacc.

Cornell Bull. 36.
On living leaves of *Quercus nigra* (*Q. aquatica*). Lee County, Auburn, August 22, 1892 (*Richards*).

Gloeosporium serotinum E. & E.

Cornell Bull. 36.
On leaves of *Prunus serotina*. Lee County, Auburn, April, 1891 (*Atkinson*).

Gloeosporium vexans Atkinson.

Cornell Bull. 37.
On stems of *Melilotus alba*. Lee County, Auburn, August, 1890 (*Atkinson*).

COLLETOTRICHUM Corda.

Colletotrichum cladosporioides (E. & E.) Atkinson.

Ala. Bull. 160.
On *Hypericum mutilum*. Lee County, September, 1891 (*Duggar*).

Colletotrichum gossypii Southworth.

Ala. Bull. 160. Cornell Bull. 35.
On the stem, leaves, and fruit of *Gossypium herbaceum*. Generally distributed throughout the cotton-growing region.

Colletotrichum jussiaeae Earle, Bull. Torr. Club, **24**:29. 1897.

Ala. Bull. 160. Cornell Bull. 35.
On leaves of *Jussiaea decurrens*. Lee County, August 27, 1891 (*Atkinson*).

Colletotrichum lindemuthianum (Sacc. & Mag.) Scribner.

Ala. Bull. 160. Cornell Bull. 35.
On leaves, stems, and pods of *Phaseolus vulgaris*. Lee County, Auburn, August 6, 1891 (*Newman*).

Colletotrichum lineola Corda.

Cornell Bull. 35.

On leaves of *Sorghum vulgare*. Lee County, Auburn, July, 1890 (*Atkinson*).

On dead leaves of *Sorghum halepense*. Lee County, Auburn, July (*Atkinson*); Montgomery County, September 8, 1891 (*Atkinson*).

Louisiana, New Jersey.

CORYNEUM Nees.

Coryneum disciforme ellipticum B. & Br.

Ala. Bull. 160.

On *Betula nigra*. Lee County, April, 1896 (*Underwood & Earle*)

Coryneum microstictum B. & Br.

Grevillea, **2**: 153. Ala. Bull. 160.

On Rosa (*Peters*).

CYLINDROSPORIUM Unger.

Cylindrosporium celtidis Earle, Bull. Torr. Club, **24**: 29. 1897.

Ala. Bull. 160. Cornell Bull. 36.

On leaves of *Celtis mississippiensis*. Montgomery County, Montgomery, November 10, 1891 (*Atkinson*).

Cylindrosporium gnaphalicolum Atkinson.

Cornell Bull. 36.

On living leaves of *Gnaphalium* sp. Lee County, July 24, 1891 (*Duggar & Newman*).

Cylindrosporium minor E. & K.

Cornell Bull. 36.

On leaves of *Fraxinus caroliniana* (*F. platycarpa*). Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*).

Cylindrosporium padi Karst.

Ala. Bull. 160. Cornell Bull. 36.

On *Prunus* sp., in cultivation. Lee County, July, 1890 (*Atkinson*).

On leaves of *Prunus angustifolia*. Perry County, Uniontown, July, 1890 (*Atkinson*).

On leaves of *Prunus serotina*. Lee County, Auburn, July 3, 1891 (*Atkinson*); Macon County, August, 1896 (*Carver*).

Louisiana, New Jersey.

Cylindrosporium rubi E. & E.

Cornell Bull. 36.

On the upper side of leaves of Rubus. Perry County, Uniontown, July 11, 1890 (*Atkinson*).

Cylindrosporium saccharinum E. & E.

Ala. Bull. 160. Cornell Bull. 36.

On leaves of *Acer rubrum*. Lee County, October 14, 1891 (*Duggar*).

Cylindrosporium steironemae Atkinson.

Cornell Bull. 36.

On leaves of *Steironema* sp. Lee County, Auburn, May 9, 1892 (*Atkinson*).

Cylindrosporium ulmicolum E. & E.

Ala. Bull. 161. Cornell Bull. 36.

On leaves of *Ulmus americana*. Lee County, Auburn, October 23, 1891 (*Duggar*).

PESTALOZZIA De Not.

Pestalozzia annulata B. & C.

Grevillea, **2**: 155. Ala. Bull. 161.

On *Ilex* sp. (*Beaumont*).

Pestalozzia concentrica B. & C.

Grevillea, **2**: 156. Ala. Bull. 161.

On *Crataegus* sp. (*Beaumont*).

On *Castanea pumila* (*Beaumont*).

On *Cydonia vulgaris*. Washington County, July, 1896 (*Earle*).

South Carolina, North Carolina.

Pestalozzia clavispora Atkinson.

Cornell Bull. 37.

On fallen leaves of *Quercus rubra*. (?) Lee County, Auburn, October 3, 1891 (*Atkinson*).

Pestalozzia flagellata Earle, Bull. Torr. Club, **24**:30. 1897.

Ala. Bull. 162. Cornell Bull. 37.

On leaves of *Quercus* sp. Lee County, Auburn, August, September 26, 1891 (*Duggar*).

Pestalozzia minuta E. & E.

Cornell Bull. 37.

On dead limbs of *Hicoria ovata*. Lee County, January, 1891 (*Atkinson*).

On bark of Vitis. Lee County, Auburn, February, 1891 (*Atkinson*).

Pestalozzia stictica B. & C.

Grevillea, **2**:155. Ala. Bull. 162.

On leaves of *Tilia* sp. (*Beaumont*).

South Carolina.

Pestalozzia turgida Atkinson.

Cornell Bull. 37.

On dead leaves of Crataegus. Lee County, Auburn, November 1, 1891 (*Atkinson*).

PESTALOZZIELLA Sacc. & Ell.

Pestalozziella gossypina Atkinson.

Cornell Bull. 38.

On stems of *Gossypium herbaceum*. Lee County, Auburn, January 27, 1891 (*Atkinson*).

MELANCONIUM Link.

Melanconium oblongum Berk.

Grevillea, **2**:153. Ala. Bull. 161.

On *Juglans cinerea* (*Peters*).

New England, New Jersey.

Melanconium sphaerospermum (Pers.) Link.

Cornell Bull. 37.

On stems of *Arundinaria tecta*. Lee County, Auburn, September 9, 1891 (*Atkinson*).

MYXORMIA B. & Br.

Myxormia atroviridis B. & Br.

Grevillea, **3**:100. Ala. Bull. 161.

On decaying bark of Rubus (*Beaumont*).

SEPTOGLOEUM E. & E.

Septogloeum profusum (E. & E.) Tracy & Earle.

Cornell Bull. 38.

On living leaves of *Ulmus alata*. (?) Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*).

STEGANOSPORIUM Sacc.

Steganosporium irregulare (B. & C.) Sacc.

Grevillea, **2**:154, under Coryneum. Ala. Bull. 162.

On *Betula* sp. (*Beaumont*).

Order SPHAEROPSIDALES.

Family SPHAEROPSIDACEAE.

PHYLLOSTICTA Pers.

Phyllosticta acericola C. & E.

Cornell Bull. 31.

On leaves of *Acer rubrum*. Lee County, Auburn (*Atkinson*).

Phyllosticta adusta E. & M.

Cornell Bull. 31.

On seedling leaves of *Citrus limon*, the lemon. Lee County, Auburn, October 19, 1889 (*Atkinson*).

Phyllosticta amaranthi E. & K.

Ala. Bull. 167. Cornell Bull. 31.

On leaves of *Amaranthus retroflexus*. Lee County, Auburn, August 5, 1891 (*Duggar*).

Phyllosticta arida Earle, Bull. Torr. Club, **25**: 367. 1898.

On *Acer negundo*. Lee County, Auburn, June 5, 1897 (*Earle & Baker*).

Phyllosticta azedarachis Thuem.

Ala. Bull. 167.

On *Melia azedarach*. Lee County, July, 1891 (*Duggar*).

Phyllosticta batatae Thuem.

Ala. Bull. 167. Cornell Bull. 31.

On leaves of *Ipomoea batatas*. Lee County, Auburn, October 4, 1891 (*Atkinson*). Macon County, October, 1896 (*Carver*).

Phyllosticta bumeliae Underwood & Earle.

Grevillea, **3**: 2, as *Sphaeropsis maculans* B. & C.

On leaves of Bumelia (*Peters*).

Phyllosticta catalpae E. & M.

Ala. Bull. 167. Cornell Bull. 31.

On leaves of *Catalpa catalpa*. Lee County, Auburn, August 15, 1891 (*Atkinson*). Hale County, May, 1896 (*Underwood*).

New Jersey.

Phyllosticta circumvelata Winter.

Ala. Bull. 167. Cornell Bull. 31.

On leaves of *Liriodendron tulipifera*. Lee County, Auburn, July 18, 1892 (*Richards*).

Phyllosticta cruenta Fr.

Ala. Bull. 167.

On *Vagnera* (*Smilacina*) *racemosa*. Winston County, June, 1896 (*Underwood*). Lee County, July, 1896 (*Underwood & Earle*).

Phyllosticta glauca Cooke.

Ala. Bull. 167.

On *Magnolia virginiana*. Lee County, November, 1895 (*Underwood*).

Phyllosticta gossypina E. & M. (?)

Cornell Bull. 31.

On dead leaves of *Gossypium herbaceum*. Lee County, Auburn (*Atkinson*).

Phyllosticta lactucae Atkinson.

Ala. Bull. 167.

On *Lactuca canadensis*. Lee County, June, 1891 (*Newman*).

Phyllosticta leucocarpae Atkinson.

Cornell Bull. 31.

On leaves of *Pyrus* sp. Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*).

Phyllosticta maclurae E. & E.

Cornell Bull. 31.

On leaves of *Toxylon pomiferum* (*Maclura aurantiaca*). Lee County, Auburn, August, 1893, (*Duggar*).

Phyllosticta macroguttata Earle, Bull. Torr. Club, **25**: 367. 1898.

Ala. Bull. 167. Cornell Bull. 31. In both as *P. desmodii* E. & E.

On *Meibomia* sp. Lee County, Auburn, June 28, 1892 (*Atkinson*).

On *Meibomia dillenii*. August 11, 1897 (*Earle & Baker*).

Phyllosticta minima (B. & C.) Underwood & Earle.

Grevillea, **3**: 2, under Sphaeropsis. Ala. Bull. 168.

On *Acer rubrum*. Dekalb County, May, 1896 (*Underwood*). Lee County, May, 1896 (*Underwood & Earle*). Winston County, June, 1896 (*Underwood*).

New England.

Phyllosticta phytolaccae Cooke.
Ala. Bull. 168. Cornell Bull. 31.
On leaves of *Phytolacca decandra*. Lee County, Auburn, July 18, 1892 (*Richards*).

Phyllosticta pirina Sacc.
Ala. Bull. 168. Cornell Bull. 31.
On leaves of *Malus malus*, the apple. Lee County, Goldhill, September, 1890 (*Atkinson*). Lee County, July, 1896 (*Underwood & Earle.*)
On *Pyrus communis*. Montgomery County, Mathews, June 17, 1891 (*Atkinson*).

Phyllosticta podophylli (Curt.) Winter.
Ala. Bull. 168.
On *Podophyllum peltatum*. Dekalb County, May, 1896 (*Underwood*).

Phyllosticta rhododendri West.
Ala. Bull. 168. Cornell Bull. 31.
On leaves of *Azalea nudiflora*. Lee County, Auburn, July 18, 1892 (*Richards*).

Phyllosticta serotina Cooke.
Ala. Bull. 168.
On *Prunus serotina*. Lee County, July, 1891 (*Duggar*).
New Jersey.

Phyllosticta siliquastri Sacc. & Speg.
Ala. Bull. 168. Cornell Bull. 31.
On leaves of *Cercis canadensis*. Lee County, Wright's Mill, near Auburn, August 7, 1891 (*Duggar & Newman*).
Europe.

Phyllosticta sphaeropsoidea E. & E.
Ala. Bull. 168.
On *Aesculus pavia*. Lee County, May, 1896 (*Underwood & Earle*). Tuscaloosa County, May, 1896 (*Underwood*).

Phyllosticta vaccinii Earle, Bull. Torr. Club, **24**:31. 1897.
Ala. Bull. 168.
On *Vaccinium arboreum*. Lee County, April 25, 1896 (*Underwood & Earle*).

Phyllosticta violae Desm.
Cornell Bull. 31.
On *Viola tricolor*. Lee County, Auburn, January 29, 1891 (*Atkinson*).

Phyllosticta viticola Thuem.
Ala. Bull. 168.
On *Vitis rotundifolia*. Lee County, October, 1895 (*Underwood*).

PHOMA Fr.

Phoma astericola Atkinson.
Cornell Bull. 30.
On stems and leaves of Aster. Lee County, Auburn (*Atkinson*).

Phoma campylospora B. & C.
Peters coll. No. 113. Ala. Bull. 165.
On *Panicum* sp. (*Peters*).

Phoma chartarum B. & C.
Grevillea, **2**:83. Ala. Bull. 165.
On white paper (*Beaumont*).

Phoma elongata (B. & C.) Sacc.
Grevillea, **2**:181, under Sphaeropsis. Ala. Bull. 165.
On cultivated Gladiolus (*Peters*).

Phoma glandicola (Desm.) Lév.
Ala. Bull. 166.
On old acorns. Lee County, April, 1896 (*Underwood & Earle*).
India?, Europe.

Phoma gloeosporioides Atkinson.
Cornell Bull. 30.
On dead leaves of *Quercus digitata*. Lee County, Auburn, February, 1890 (*Atkinson*).

Phoma gossypii Sacc.
Cornell Bull. 30.
On dead stems of *Gossypium herbaceum*. Lee County, Auburn, January 27, 1891 (*Atkinson*).

Phoma lathyrina Sacc.
Cornell Bull. 30.
On stems of *Vigna catjang*. Lee County, Auburn, October 16, 1889 (*Atkinson*).

Phoma maculifera Sacc.
Grevillea, **2**: 83, as *P. maculare*. Ala. Bull. 166.
On *Doellingeria* sp. (*Beaumont*).

Phoma melaleuca B. & C.
Grevillea, **2**: 82. Ala. Bull. 166.
On leaves of *Aralia spinosa* (*Peters*).
South Carolina.

Phoma micromegala (B. & C.) Sacc.
Grevillea **2**: 180, under Sphaeropsis. Ala. Bull. 166.
On naked roots of pine (*Beaumont*).

Phoma subcircinata E. & E.
Cornell Bull. 30.
On pods of *Phaseolus lunatus*, the butter bean. Lee County, Auburn (*Atkinson*).

MACROPHOMA Ber. & Vogel.

Macrophoma diospyri Earle, Bull. Torr. Club, **24**: 30. 1897.
Ala. Bull. 165.
On green fallen fruits of *Diospyros virginiana*. Lee County, Auburn, July, 1896 (*Underwood & Earle*).

SPHAERONEMA Fr.

Sphaeronema corneum E. & E.
Cornell Bull. 33.
On languid leaves of *Oenothera laciniata*. Lee County, Auburn, July 26, 1891 (*Atkinson*).

Sphaeronema epigloeum B. & C.
Peters coll. No. 110. Ala. Bull. 171.
On *Tremella* sp. (*Peters*).

Sphaeronema spina B. & Rav.
Grevillea, **2**: 177. Ala. Bull. 171.
On dead leaves of Fraxinus (*Beaumont*).
South Carolina.

SPHAEROPSIS Mont.

Sphaeropsis cydoniae C. & E.
On Cydonia. Lee County, December, 1897 (*Baker*).
New Jersey.

Sphaeropsis maclurae Cooke.
Ala. Bull. 172.
On *Toxylon pomiferum*. Lee County, March, 1896 (*Underwood & Earle*).

VERMICULARIA Fr.

Vermicularia affinis Sacc. & Briard.
Ala. Bull. 172.
On *Panicum virgatum*. Lee County, February, 1888 (*Newman*).
On *Sieglingia seslerioides*. Lee County, January, 1889 (*Newman*).
On *Sorghum* sp. Lee County, July, 1890 (*Atkinson*).
On *Sorghum halepense*. Montgomery County, September, 1891 (*Atkinson*).

Vermicularia circinans Berk.
Cornell Bull. 33.
On Allium in cultivation. Lee County, Auburn (*Atkinson*).
Pennsylvania.

Vermicularia dematium (Pers.) Fr.
Grevillea, 3:6. Ala. Bull. 172.
On Phytolacca (*Beaumont*).
Pennsylvania, New Jersey.

Vermicularia eryngii (Cooke) Fkl.
Ala. Bull. 172.
On dead umbelliferous stem. Lee County, April, 1896 (*Underwood & Earle*).

Vermicularia liliacearum Schw.
Ala. Bull. 172.
On *Agave virginica*. Lee County, July, 1896 (*Underwood & Earle*).
Louisiana, Ohio.

Vermicularia sanguinea E. & Hal.
Ala. Bull. 173.
On *Sorghum vulgare*, chicken corn. Perry County, July, 1890 (*Atkinson*).
On *Sorghum* sp., Jerusalem corn. Lee County, October, 1895 (*Underwood*).

DOTHIORELLA Sacc.

Dothiorella macrospora (B. & C.) Sacc.
Grevillea, 2: 181, under Sphaeropsis. Ala. Bull. 164.
On *Magnolia virginiana* (*M. glauca*) (*Peters*).
Pennsylvania.

CYTOSPORA Ehrenb.

Cytospora grandis Peck.
Ala. Bull. 164.
On *Rhus* sp. Lee County, March, 1896 (*Underwood & Earle*).

Cytospora persicae Schw.
Ala. Bull. 164.
On *Amygdalus persica*. Lee County, September, 1896 (*Earle*).

DIPLODIA Fr.

Diplodia gossypina Cooke.
Cornell Bull. 29.
On old capsules of *Gossypium herbaceum*. Pike County, Brundidge, September 5, 1891 (*Atkinson*).

Diplodia herbarum (Corda) Lév.
Ala. Bull. 164. Cornell Bull. 29.
On dead stems of *Lactuca* sp. Lee County, Auburn, May 1, 1892 (*Atkinson*).
New Jersey.

Diplodia macrospora Earle, Bull. Torr. Club, 24: 29. 1897.
Ala. Bull. 164.
On weathered stalks of *Zea mays*. Lee County, October, March, 1896 (*Underwood & Earle*).

Diplodia maura Cooke.
Ala. Bull. 164. Cornell Bull. 29.
On branches of *Pyrus communis*. Mobile County, 1890 (*Atkinson*). Lee County, 1890 (*Atkinson*).
New Jersey.

Diplodia maydis (Berk.) Sacc.
Ala. Bull. 164.
On old, withered stalks of *Zea mays*. Lee County, January, 1896 (*Underwood & Earle*).

DARLUCA Cast.

Darluca filum (Biv.) Cast.
Grevillea, 2: 179. Ala. Bull. 164. Cornell Bull. 36.
On tea (*Beaumont*).
On *Puccinia pruni-spinosae* (on peach). Lee County, August, 1891 (*Duggar*).
On Uredo (on Andropogon). Lee County, August, 1891 (*Duggar & Newman*).
Louisiana. New Jersey, Ohio.

HENDERSONIA Berk.

Hendersonia arundinaceae (Desm.) Sacc.

Cornell Bull. 29.
On dead stems of *Chrysopogon avenaceus*. Lee County, Auburn, November 1, 1891 (*Duggar*).

Hendersonia crataegicola Atkinson.

Ala. Bull. 165, as *H. cydoniae* Cooke & Ellis. Cornell Bull 30.
On leaves of *Crataegus flava*. Lee County, Auburn, August, 1890 (*Atkinson*).

Hendersonia erianthi Atkinson.

Ala. Bull. 165, as *H. donacis* Sacc. Cornell Bull. 29.
On dead stems of Erianthus. Lee County, November 12, 1891 (*Duggar*).

Hendersonia effusa B. & C.

Ala. Bull. 165. Cornell Bull. 29.
On blades of *Aristida purpurascens minor*. Lee County, Auburn, October 11, 1891 (*Atkinson*).

Hendersonia officinalis Atkinson.

Cornell Bull. 29.
On dead leaves of *Sassafras sassafras*. Lee County, Auburn, July 29, 1891 (*Duggar*).

PROSTHEMIUM Kunze.

Prosthemium palmatum Earle, Bull. Torr. Club, **24**:31. 1897.

Ala. Bull. 168.
On rotten wood. Lee County, Auburn, March 28, 1896 (*Underwood & Earle*).

STAGONOSPORA Sacc.

Stagonospora ischaemi Sacc.

Ala. Bull. 172.
On *Andropogon furcatus*. Lee County, September, 1891 (*Duggar*).

Stagonospora paspali Atkinson.

Cornell Bull. 33.
On *Sieglingia seslerioides*. Lee County, Wright's Mill, July 11, 1891 (*Duggar*).
On leaves of *Paspalum laeve*. Lee County, Auburn, July 18, 1891 (*Atkinson*).

SEPTORIA Fr.

Septoria alabamensis Atkinson, Journ. Elisha Mitch. Soc. **10**:78. 1894.

Ala. Bull. 169. Cornell Bull. 33.
On living leaves of *Glechoma hederacea*. Lee County, Auburn, January 29, February 27, 1891 (*Atkinson*).

Septoria albo-nigra B. & C.

Grevillea, **3**:8. Ala. Bull. 169.
On living leaves (*Peters*).

Septoria bromi Sacc. (?)

Cornell Bull. 32.
On leaves of Elymus. Lee County, Auburn, July 5, 1890 (*Atkinson*).

Septoria brunellae E. & H.

Ala. Bull. 169. Cornell Bull. 32. Journ. Elisha Mitch. Soc. **10**:76. 1894.
On *Prunella vulgaris*. Montgomery County, Shorter, July 16, 1890 (*Atkinson*).

Septoria cacaliae E. & K.

Ala. Bull. 169.
On *Mesadenia* (*Cacalia*) *tuberosa*. Lawrence County, June, 1896 (*Underwood*).

Septoria cerasina Peck.

Ala. Bull. 169.
On *Prunus* sp. Lee County, July, 1891 (*Newman*).

Septoria cerastii Rob. & Desm.

Ala. Bull. 169. Cornell Bull. 32.

On dead or languid leaves of *Cerastium arvense*. Lee County, Auburn, March 25, 1891 (*Atkinson*).

On *Cerastium viscosum*. Lee County, March, 1896 (*Underwood & Earle*).

Septoria confusa Atkinson.

Cornell Bull. 33.

On leaves of *Jussiaea leptocarpa*. Lee County, Auburn, August 24, 1891 (*Duggar & Newman*).

Septoria dianthi West.

Ala. Bull. 170. Cornell Bull. 32.

On cultivated *Dianthus barbatus*. Lee County, Auburn, March 20, 1891 (*Atkinson*).

Septoria erechtites E. & E.

Ala. Bull. 170. Cornell Bull. 32.

On *Erechtites hieracifolia*. Lee County, Auburn, September 10, 1891 (*Duggar*).

Septoria fraxini Desm.

Cornell Bull. 33.

On living leaves of *Fraxinus caroliniana* (*F. platycarpa*). Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*).

Septoria galiorum Ellis.

Cornell Bull. 31.

On dead stems of *Houstonia patens*. Lee County, Auburn, February 16, 1890 (*Atkinson*).

Septoria graminum Desm.

Ala. Bull. 170. Cornell Bull. 32.

On *Syntherisma* (*Panicum*) *sanguinale*. Lee County, Auburn, August 29, 1891 (*Atkinson*).

New Jersey, Ohio.

Septoria lactucae Pass.

Cornell Bull. 32.

On leaves of *Lactuca leucophaea*. Lee County, Auburn, June 26, 1891 (*Newman*).

Septoria lepidiicola E. & M.

Cornell Bull. 31.

On leaves of *Lepidium virginicum*. Lee County, Auburn, February 9, 1890 (*Atkinson*).

Septoria neglecta Earle, Bull. Torr. Club, **24**: 31. 1897.

Ala. Bull. 170.

On persistent living leaves of *Quercus phellos*. Lee County, Auburn, February, March, April, 1896 (*Underwood & Earle*).

Septoria oenotherae West.

Ala. Bull. 170. Cornell Bull. 32.

On *Oenothera laciniata*. Lee County, March, 1896 (*Underwood & Earle*). Lee County, Auburn (*Atkinson*).

Septoria pulchella B. & C.

Grevillea, **3**: 8. Ala. Bull. 170.

On leaves of Andromeda (*Peters*).

Septoria rubi West.

Ala. Bull. 170. Cornell Bull. 32.

On leaves of cultivated Rubus. Lee County, Auburn, August 8, 1890 (*Atkinson*).

On *Rubus* sp. Dekalb County, May, 1896 (*Underwood*).

Septoria rubi alba Peck.

Ala. Bull. 170. Cornell Bull. 32.

On living leaves of *Rubus trivialis*. Mobile County, April, 1891 (*Zimmer Brothers*). Lee County, Auburn (*Atkinson*).

Septoria sambucina Peck.

Ala. Bull. 171. Cornell Bull. 32.

On *Sambucus canadensis*. Lee County, Auburn, August 24, 1891 (*Duggar*).

Louisiana.

Septoria secalis Prill. & Delacr.

Ala. Bull. 171.
On *Secale cereale.* Lee County, April, 1896 (*Underwood & Earle*).

Septoria sonchifolia Cooke.

Cornell Bull. 32.
On leaves of *Sonchus oleraceus.* Lee County, Auburn, 1892 (*Atkinson*).

Septoria sonchina Thuem.

Ala. Bull. 171. Cornell Bull. 32.
On living leaves of *Sonchus oleraceus.* Lee County, Auburn, February 25, 1891 (*Benton*).

Septoria specularіae B. & C.

Ala. Bull. 171. Cornell Bull. 32.
On *Legouzia perfoliata.* Lee County, Auburn, March 28, 1890 (*Atkinson*).
South Carolina.

Septoria stigma B. & C.

Grevillea, 3:9. Ala. Bull. 171.
On leaves of Symplocos (*Peters*).

Septoria symploci E. & M.

On Symplocos. Lee County, June, 1897 (*Earle & Baker*).

Septoria verbascicola B. & C.

Ala. Bull. 171.
On *Verbascum blattaria.* Madison County, May, 1896 (*Underwood*).

Septoria violae West.

Ala. Bull. 171. Cornell Bull. 32.
On *Viola primulaefolia.* Macon County, Shorter, July 16, 1890 (*Atkinson*).
Louisiana, Ohio.

Septoria virgaurea Desm. (?)

Ala. Bull. 171. Cornell Bull. 32.
On *Solidago serotina.* Lee County, Auburn (*Atkinson*).

Septoria xanthii Desm.

Ala. Bull. 171. Cornell Bull. 32.
On *Xanthium* sp. Perry County, Uniontown, July 11, 1890 (*Atkinson*).

Septoria sp.

Bull. Torr. Club, 25:368.
On *Silene virginica.* Lee County, Auburn, May 29, 1897 (*Earle & Baker*).

RHABDOSPORA Mont.

Rhabdospora verrucaeformis (B. & C.) Sacc.

Grevillea, 3:11, under Septoria. Ala. Bull. 169.
On branches of Cephalanthus (*Peters*).

PHLYCTAENA Desm. & Mont.

Phlyctaena gossypii Sacc.

Cornell Bull. 30.
On dead stems of *Gossypium herbaceum.* Lee County, Auburn, January 27, 1891 (*Atkinson*).

Phlyctaena vagabunda Desm.

Grevillea, 2:100. Ala. Bull. 165.
On stems of Phytolacca (*Beaumont*).

SPORONEMA Desm.

Sporonema camelliae Earle, Bull. Torr. Club, 24:32. 1897.

Ala. Bull. 172.
On living leaves of *Camellia japonica.* Lee County, Auburn, March, April, 1896 (*Burton*).

Sporonema ilicis Earle, Bull. Torr. Club, 24:32. 1897.

On languishing leaves of *Ilex opaca.* Lee County, December, 1895 (*Underwood*); January, February, March, 1896 (*Underwood & Earle*).

Septoria cerastii Rob. & Desm.

Ala. Bull. 169. Cornell Bull. 32.

On dead or languid leaves of *Cerastium arvense*. Lee County, Auburn, March 25, 1891 (*Atkinson*).

On *Cerastium viscosum*. Lee County, March, 1896 (*Underwood & Earle*).

Septoria confusa Atkinson.

Cornell Bull. 33.

On leaves of *Jussiaea leptocarpa*. Lee County, Auburn, August 24, 1891 (*Duggar & Newman*).

Septoria dianthi West.

Ala. Bull. 170. Cornell Bull. 32.

On cultivated *Dianthus barbatus*. Lee County, Auburn, March 20, 1891 (*Atkinson*).

Septoria erechtites E. & E.

Ala. Bull. 170. Cornell Bull. 32.

On *Erechtites hieracifolia*. Lee County, Auburn, September 10, 1891 (*Duggar*).

Septoria fraxini Desm.

Cornell Bull. 33.

On living leaves of *Fraxinus caroliniana* (*F. platycarpa*). Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*).

Septoria galiorum Ellis.

Cornell Bull. 31.

On dead stems of *Houstonia patens*. Lee County, Auburn, February 16, 1890 (*Atkinson*).

Septoria graminum Desm.

Ala. Bull. 170. Cornell Bull. 32.

On *Syntherisma* (*Panicum*) *sanguinale*. Lee County, Auburn, August 29, 1891 (*Atkinson*).

New Jersey, Ohio.

Septoria lactucae Pass.

Cornell Bull. 32.

On leaves of *Lactuca leucophaea*. Lee County, Auburn, June 26, 1891 (*Newman*).

Septoria lepidiicola E. & M.

Cornell Bull. 31.

On leaves of *Lepidium virginicum*. Lee County, Auburn, February 9, 1890 (*Atkinson*).

Septoria neglecta Earle, Bull. Torr. Club, **24**: 31. 1897.

Ala. Bull. 170.

On persistent living leaves of *Quercus phellos*. Lee County, Auburn, February, March, April, 1896 (*Underwood & Earle*).

Septoria oenotherae West.

Ala. Bull. 170. Cornell Bull. 32.

On *Oenothera laciniata*. Lee County, March, 1896 (*Underwood & Earle*). Lee County, Auburn (*Atkinson*).

Septoria pulchella B. & C.

Grevillea, **3**: 8. Ala. Bull. 170.

On leaves of Andromeda (*Peters*).

Septoria rubi West.

Ala. Bull. 170. Cornell Bull. 32.

On leaves of cultivated Rubus. Lee County, Auburn, August 8, 1890 (*Atkinson*).

On *Rubus* sp. Dekalb County, May, 1896 (*Underwood*).

Septoria rubi alba Peck.

Ala. Bull. 170. Cornell Bull. 32.

On living leaves of *Rubus trivialis*. Mobile County, April, 1891 (*Zimmer Brothers*). Lee County, Auburn (*Atkinson*).

Septoria sambucina Peck.

Ala. Bull. 171. Cornell Bull. 32.

On *Sambucus canadensis*. Lee County, Auburn, August 24, 1891 (*Duggar*).

Louisiana.

Septoria secalis Prill. & Delacr.
Ala. Bull. 171.
On *Secale cereale.* Lee County, April, 1896 (*Underwood & Earle*).

Septoria sonchifolia Cooke.
Cornell Bull. 32.
On leaves of *Sonchus oleraceus.* Lee County, Auburn, 1892 (*Atkinson*).

Septoria sonchina Thuem.
Ala. Bull. 171. Cornell Bull. 32.
On living leaves of *Sonchus oleraceus.* Lee County, Auburn, February 25, 1891 (*Benton*).

Septoria speculariae B. & C.
Ala. Bull. 171. Cornell Bull. 32.
On *Legouzia perfoliata.* Lee County, Auburn, March 28, 1890 (*Atkinson*).
South Carolina.

Septoria stigma B. & C.
Grevillea, **3**:9. Ala. Bull. 171.
On leaves of Symplocos (*Peters*).

Septoria symploci E. & M.
On Symplocos. Lee County, June, 1897 (*Earle & Baker*).

Septoria verbascicola B. & C.
Ala. Bull. 171.
On *Verbascum blattaria.* Madison County, May, 1896 (*Underwood*).

Septoria violae West.
Ala. Bull. 171. Cornell Bull. 32.
On *Viola primulaefolia.* Macon County, Shorter, July 16, 1890 (*Atkinson*).
Louisiana, Ohio.

Septoria virgaurea Desm. (?)
Ala. Bull. 171. Cornell Bull. 32.
On *Solidago serotina.* Lee County, Auburn (*Atkinson*).

Septoria xanthii Desm.
Ala. Bull. 171. Cornell Bull. 32.
On *Xanthium* sp. Perry County, Uniontown, July 11, 1890 (*Atkinson*).

Septoria sp.
Bull. Torr. Club, **25**:368.
On *Silene virginica.* Lee County, Auburn, May 29, 1897 (*Earle & Baker*).

RHABDOSPORA Mont.

Rhabdospora verrucaeformis (B. & C.) Sacc.
Grevillea, **3**:11, under Septoria. Ala. Bull. 169.
On branches of Cephalanthus (*Peters*).

PHLYCTAENA Desm. & Mont.

Phlyctaena gossypii Sacc.
Cornell Bull. 30.
On dead stems of *Gossypium herbaceum.* Lee County, Auburn, January 27, 1891 (*Atkinson*).

Phlyctaena vagabunda Desm.
Grevillea, **2**:100. Ala. Bull. 165.
On stems of Phytolacca (*Beaumont*).

SPORONEMA Desm.

Sporonema camelliae Earle, Bull. Torr. Club, **24**:32. 1897.
Ala. Bull. 172.
On living leaves of *Camellia japonica.* Lee County, Auburn, March, April, 1896 (*Burton*).

Sporonema ilicis Earle, Bull. Torr. Club, **24**:32. 1897.
On languishing leaves of *Ilex opaca.* Lee County, December, 1895 (*Underwood*); January, February, March, 1896 (*Underwood & Earle*).

EARLE, F. S. 1901

1) Slime Molds.) Ex 'Plant Life of Alabs
2) A List of Alabama Fungi) Alabama' by C. Mohr

Contr. U.S. natn. Herb., 6, Title p., pp. 139-263, 1901.

MICROFILM No. 14193

Phyllosticta sphaeropsoidea E. & E.
Ala. Bull. 168.
On *Aesculus paria*. Lee County, May, 1896 (*Underwood & Earle*). Tuscaloosa County, May, 1896 (*Underwood*).

Phyllosticta vaccinii Earle, Bull. Torr. Club, **24**:31. 1897.
Ala. Bull. 168.
On *Vaccinium arboreum*. Lee County, April 25, 1896 (*Underwood & Earle*).

Phyllosticta violae Desm.
Cornell Bull. 31.
On *Viola tricolor*. Lee County, Auburn, January 29, 1891 (*Atkinson*).

Phyllosticta viticola Thuem.
Ala. Bull. 168.
On *Vitis rotundifolia*. Lee County, October, 1895 (*Underwood*).

PHOMA Fr.

Phoma astericola Atkinson.
Cornell Bull. 30.
On stems and leaves of Aster. Lee County, Auburn (*Atkinson*).

Phoma campylospora B. & C.
Peters coll. No. 113. Ala. Bull. 165.
On *Panicum* sp. (*Peters*).

Phoma chartarum B. & C.
Grevillea, **2**:83. Ala. Bull. 165.
On white paper (*Beaumont*).

Phoma elongata (B. & C.) Sacc.
Grevillea, **2**:181, under Sphaeropsis. Ala. Bull. 165.
On cultivated Gladiolus (*Peters*).

Phoma glandicola (Desm.) Lév.
Ala. Bull. 166.
On old acorns. Lee County, April, 1896 (*Underwood & Earle*).
India?, Europe.

Phoma gloeosporioides Atkinson.
Cornell Bull. 30.
On dead leaves of *Quercus digitata*. Lee County, Auburn, February, 1890 (*Atkinson*).

Phoma gossypii Sacc.
Cornell Bull. 30.
On dead stems of *Gossypium herbaceum*. Lee County, Auburn, January 27, 1891 (*Atkinson*).

Phoma lathyrina Sacc.
Cornell Bull. 30.
On stems of *Vigna catjang*. Lee County, Auburn, October 16, 1889 (*Atkinson*).

Phoma maculifera Sacc.
Grevillea, **2**:83, as *P. maculare*. Ala. Bull. 166.
On *Doellingeria* sp. (*Beaumont*).

Phoma melaleuca B. & C.
Grevillea, **2**:82. Ala. Bull. 166.
On leaves of *Aralia spinosa* (*Peters*).
South Carolina.

Phoma micromegala (B. & C.) Sacc.
Grevillea **2**:180, under Sphaeropsis. Ala. Bull. 166.
On naked roots of pine (*Beaumont*).

Phoma subcircinata E. & E.
Cornell Bull. 30.
On pods of *Phaseolus lunatus*, the butter bean. Lee County, Auburn (*Atkinson*).

MACROPHOMA Ber. & Vogel.

Macrophoma diospyri Earle, Bull. Torr. Club, **24**:30. 1897.
Ala. Bull. 165.
On green fallen fruits of *Diospyros virginiana*. Lee County, Auburn, July, 1896 (*Underwood & Earle*).

SPHAERONEMA Fr.

Sphaeronema corneum E. & E.
Cornell Bull. 33.
On languid leaves of *Oenothera laciniata*. Lee County, Auburn, July 26, 1891 (*Atkinson*).

Sphaeronema epigloeum B. & C.
Peters coll. No. 110. Ala. Bull. 171.
On *Tremella* sp. (*Peters*).

Sphaeronema spina B. & Rav.
Grevillea, **2**:177. Ala. Bull. 171.
On dead leaves of Fraxinus (*Beaumont*).
South Carolina.

SPHAEROPSIS Mont.

Sphaeropsis cydoniae C. & E.
On Cydonia. Lee County, December, 1897 (*Baker*).
New Jersey.

Sphaeropsis maclurae Cooke.
Ala. Bull. 172.
On *Toxylon pomiferum*. Lee County, March, 1896 (*Underwood & Earle*).

VERMICULARIA Fr.

Vermicularia affinis Sacc. & Briard.
Ala. Bull. 172.
On *Panicum virgatum*. Lee County, February, 1888 (*Newman*).
On *Sieglingia seslerioides*. Lee County, January, 1889 (*Newman*).
On *Sorghum* sp. Lee County, July, 1890 (*Atkinson*).
On *Sorghum halepense*. Montgomery County, September, 1891 (*Atkinson*).

Vermicularia circinans Berk.
Cornell Bull. 33.
On Allium in cultivation. Lee County, Auburn (*Atkinson*).
Pennsylvania.

Vermicularia dematium (Pers.) Fr.
Grevillea, **3**:6. Ala. Bull. 172.
On Phytolacca (*Beaumont*).
Pennsylvania, New Jersey.

Vermicularia eryngii (Cooke) Fkl.
Ala. Bull. 172.
On dead umbelliferous stem. Lee County, April, 1896 (*Underwood & Earle*).

Vermicularia liliacearum Schw.
Ala. Bull. 172.
On *Agave virginica*. Lee County, July, 1896 (*Underwood & Earle*).
Louisiana, Ohio.

Vermicularia sanguinea E. & Hal.
Ala. Bull. 173.
On *Sorghum vulgare*, chicken corn. Perry County, July, 1890 (*Atkinson*).
On *Sorghum* sp., Jerusalem corn. Lee County, October, 1895 (*Underwood*).

DOTHIORELLA Sacc.

Dothiorella macrospora (B. & C.) Sacc.
Grevillea, **2**:181, under Sphaeropsis. Ala. Bull. 164.
On *Magnolia virginiana* (*M. glauca*) (*Peters*).
Pennsylvania.

CYTOSPORA Ehrenb.

Cytospora grandis Peck.
Ala. Bull. 164.
On *Rhus* sp. Lee County, March, 1896 (*Underwood & Earle*).

Cytospora persicae Schw.
Ala. Bull. 164.
On *Amygdalus persica*. Lee County, September, 1896 (*Earle*).

DIPLODIA Fr.

Diplodia gossypina Cooke.
Cornell Bull. 29.
On old capsules of *Gossypium herbaceum*. Pike County, Brundidge, September 5, 1891 (*Atkinson*).

Diplodia herbarum (Corda) Lév.
Ala. Bull. 164. Cornell Bull. 29.
On dead stems of *Lactuca* sp. Lee County, Auburn, May 1, 1892 (*Atkinson*).
New Jersey.

Diplodia macrospora Earle, Bull. Torr. Club, **24**: 29. 1897.
Ala. Bull. 164.
On weathered stalks of *Zea mays*. Lee County, October, March, 1896 (*Underwood & Earle*).

Diplodia maura Cooke.
Ala. Bull. 164. Cornell Bull. 29.
On branches of *Pyrus communis*. Mobile County, 1890 (*Atkinson*). Lee County, 1890 (*Atkinson*).
New Jersey.

Diplodia maydis (Berk.) Sacc.
Ala. Bull. 164.
On old, withered stalks of *Zea mays*. Lee County, January, 1896 (*Underwood & Earle*).

DARLUCA Cast.

Darluca filum (Biv.) Cast.
Grevillea, **2**: 179. Ala. Bull. 164. Cornell Bull. 36.
On tea (*Beaumont*).
On *Puccinia pruni-spinosae* (on peach). Lee County, August, 1891 (*Duggar*).
On Uredo (on Andropogon). Lee County, August, 1891 (*Duggar & Newman*).
Louisiana, New Jersey, Ohio.

HENDERSONIA Berk.

Hendersonia arundinaceae (Desm.) Sacc.

Cornell Bull. 29.

On dead stems of *Chrysopogon avenaceus*. Lee County, Auburn, November 1, 1891 (*Duggar*).

Hendersonia crataegicola Atkinson.

Ala. Bull. 165, as *H. cydoniae* Cooke & Ellis. Cornell Bull. 30.

On leaves of *Crataegus flava*. Lee County, Auburn, August, 1890 (*Atkinson*).

Hendersonia erianthi Atkinson.

Ala. Bull. 165, as *H. donacis* Sacc. Cornell Bull. 29.

On dead stems of Erianthus. Lee County, November 12, 1891 (*Duggar*).

Hendersonia effusa B. & C.

Ala. Bull. 165. Cornell Bull. 29.

On blades of *Aristida purpurascens minor*. Lee County, Auburn, October 11, 1891 (*Atkinson*).

Hendersonia officinalis Atkinson.

Cornell Bull. 29.

On dead leaves of *Sassafras sassafras*. Lee County, Auburn, July 29, 1891 (*Duggar*).

PROSTHEMIUM Kunze.

Prosthemium palmatum Earle, Bull. Torr. Club, **24**:31. 1897.

Ala. Bull. 168.

On rotten wood. Lee County, Auburn, March 28, 1896 (*Underwood & Earle*).

STAGONOSPORA Sacc.

Stagonospora ischaemi Sacc.

Ala. Bull. 172.

On *Andropogon furcatus*. Lee County, September, 1891 (*Duggar*).

Stagonospora paspali Atkinson.

Cornell Bull. 33.

On *Sieglingia seslerioides*. Lee County, Wright's Mill, July 11, 1891 (*Duggar*).

On leaves of *Paspalum laeve*. Lee County, Auburn, July 18, 1891 (*Atkinson*).

SEPTORIA Fr.

Septoria alabamensis Atkinson, Journ. Elisha Mitch. Soc. **10**:78. 1894.

Ala. Bull. 169. Cornell Bull. 33.

On living leaves of *Glechoma hederacea*. Lee County, Auburn, January 29, February 27, 1891 (*Atkinson*).

Septoria albo-nigra B. & C.

Grevillea, **3**:8. Ala. Bull. 169.

On living leaves (*Peters*).

Septoria bromi Sacc. (?)

Cornell Bull. 32.

On leaves of Elymus. Lee County, Auburn, July 5, 1890 (*Atkinson*).

Septoria brunellae E. & H.

Ala. Bull. 169. Cornell Bull. 32. Journ. Elisha Mitch. Soc. **10**:76. 1894.

On *Prunella vulgaris*. Montgomery County, Shorter, July 16, 1890 (*Atkinson*).

Septoria cacaliae E. & K.

Ala. Bull. 169.

On *Mesadenia* (*Cacalia*) *tuberosa*. Lawrence County, June, 1896 (*Underwood*).

Septoria cerasina Peck.

Ala. Bull. 169.

On *Prunus* sp. Lee County, July, 1891 (*Newman*).

Septoria cerastii Rob. & Desm.

Ala. Bull. 169. Cornell Bull. 32.

On dead or languid leaves of *Cerastium arvense*. Lee County, Auburn, March 25, 1891 (*Atkinson*).

On *Cerastium viscosum*. Lee County, March, 1896 (*Underwood & Earle*).

Septoria confusa Atkinson.

Cornell Bull. 33.

On leaves of *Jussiaea leptocarpa*. Lee County, Auburn, August 24, 1891 (*Duggar & Newman*).

Septoria dianthi West.

Ala. Bull. 170. Cornell Bull. 32.

On cultivated *Dianthus barbatus*. Lee County, Auburn, March 20, 1891 (*Atkinson*).

Septoria erechtites E. & E.

Ala. Bull. 170. Cornell Bull. 32.

On *Erechtites hieracifolia*. Lee County, Auburn, September 10, 1891 (*Duggar*).

Septoria fraxini Desm.

Cornell Bull. 33.

On living leaves of *Fraxinus caroliniana* (*F. platycarpa*). Montgomery County, Pikeroad, July 9, 1891 (*Atkinson*).

Septoria galiorum Ellis.

Cornell Bull. 31.

On dead stems of *Houstonia patens*. Lee County, Auburn, February 16, 1890 (*Atkinson*).

Septoria graminum Desm.

Ala. Bull. 170. Cornell Bull. 32.

On *Syntherisma* (*Panicum*) *sanguinale*. Lee County, Auburn, August 29, 1891 (*Atkinson*).

New Jersey, Ohio.

Septoria lactucae Pass.

Cornell Bull. 32.

On leaves of *Lactuca leucophaea*. Lee County, Auburn, June 26, 1891 (*Newman*).

Septoria lepidiicola E. & M.

Cornell Bull. 31.

On leaves of *Lepidium virginicum*. Lee County, Auburn, February 9, 1890 (*Atkinson*).

Septoria neglecta Earle, Bull. Torr. Club, **24**: 31. 1897.

Ala. Bull. 170.

On persistent living leaves of *Quercus phellos*. Lee County, Auburn, February, March, April, 1896 (*Underwood & Earle*).

Septoria oenotherae West.

Ala. Bull. 170. Cornell Bull. 32.

On *Oenothera laciniata*. Lee County, March, 1896 (*Underwood & Earle*). Lee County, Auburn (*Atkinson*).

Septoria pulchella B. & C.

Grevillea, **3**: 8. Ala. Bull. 170.

On leaves of Andromeda (*Peters*).

Septoria rubi West.

Ala. Bull. 170. Cornell Bull. 32.

On leaves of cultivated Rubus. Lee County, Auburn, August 8, 1890 (*Atkinson*).

On *Rubus* sp. Dekalb County, May, 1896 (*Underwood*).

Septoria rubi alba Peck.

Ala. Bull. 170. Cornell Bull. 32.

On living leaves of *Rubus trivialis*. Mobile County, April, 1891 (*Zimmer Brothers*). Lee County, Auburn (*Atkinson*).

Septoria sambucina Peck.

Ala. Bull. 171. Cornell Bull. 32.

On *Sambucus canadensis*. Lee County, Auburn, August 24, 1891 (*Duggar*).

Louisiana.

Septoria secalis Prill. & Delacr.
Ala. Bull. 171.
On *Secale cereale*. Lee County, April, 1896 (*Underwood & Earle*).

Septoria sonchifolia Cooke.
Cornell Bull. 32.
On leaves of *Sonchus oleraceus*. Lee County, Auburn, 1892 (*Atkinson*).

Septoria sonchina Thuem.
Ala. Bull. 171. Cornell Bull. 32.
On living leaves of *Sonchus oleraceus*. Lee County, Auburn, February 25, 1891 (*Benton*).

Septoria specularіae B. & C.
Ala. Bull. 171. Cornell Bull. 32.
On *Legouzia perfoliata*. Lee County, Auburn, March 28, 1890 (*Atkinson*).
South Carolina.

Septoria stigma B. & C.
Grevillea, **3**:9. Ala. Bull. 171.
On leaves of Symplocos (*Peters*).

Septoria symploci E. & M.
On Symplocos. Lee County, June, 1897 (*Earle & Baker*).

Septoria verbascicola B. & C.
Ala. Bull. 171.
On *Verbascum blattaria*. Madison County, May, 1896 (*Underwood*).

Septoria violae West.
Ala. Bull. 171. Cornell Bull. 32.
On *Viola primulaefolia*. Macon County, Shorter, July 16, 1890 (*Atkinson*).
Louisiana, Ohio.

Septoria virgaurea Desm. (?)
Ala. Bull. 171. Cornell Bull. 32.
On *Solidago serotina*. Lee County, Auburn (*Atkinson*).

Septoria xanthii Desm.
Ala. Bull. 171. Cornell Bull. 32.
On *Xanthium* sp. Perry County, Uniontown, July 11, 1890 (*Atkinson*).

Septoria sp.
Bull. Torr. Club, **25**:368.
On *Silene virginica*. Lee County, Auburn, May 29, 1897 (*Earle & Baker*).

RHABDOSPORA Mont.

Rhabdospora verrucaeformis (B. & C.) Sacc.
Grevillea, **3**:11, under Septoria. Ala. Bull. 169.
On branches of Cephalanthus (*Peters*).

PHLYCTAENA Desm. & Mont.

Phlyctaena gossypii Sacc.
Cornell Bull. 30.
On dead stems of *Gossypium herbaceum*. Lee County, Auburn, January 27, 1891 (*Atkinson*).

Phlyctaena vagabunda Desm.
Grevillea, **2**:100. Ala. Bull. 165.
On stems of Phytolacca (*Beaumont*).

SPORONEMA Desm.

Sporonema camelliae Earle, Bull. Torr. Club, **24**:32. 1897.
Ala. Bull. 172.
On living leaves of *Camellia japonica*. Lee County, Auburn, March, April, 1896 (*Burton*).

Sporonema ilicis Earle, Bull. Torr. Club, **24**:32. 1897.
On languishing leaves of *Ilex opaca*. Lee County, December, 1895 (*Underwood*); January, February, March, 1896 (*Underwood & Earle*).

PHLEOSPORA Wallr.

Phleospora anemonis E. & K.
On *Anemone virginica*. Chambers County, June, 1897 (*Earle*).

Family ZYTHIACEAE (Nectrioidaceae).

STAGANOPSIS Sacc.

Staganopsis pallida (B. & C.) Sacc.
Grevillea, 3:6, under Hendersonia. Ala. Bull. 173.
On Cornus (*Peters*).

Family LEPTOSTROMATACEAE.

PIGGOTIA B. & C.

Piggotia fraxini B. & C.
Ala. Bull. 174. Cornell Bull. 35.
On *Fraxinus* sp. Lee County, Auburn, autumn, 1890 (*Atkinson*). Lee County, November, 1895 (*Underwood*).
Pennsylvania.

MELASMIA Lév.

Melasmia acerina Lév.
Ala. Bull. 174. Cornell Bull. 34.
On living leaves of *Acer rubrum*. Lee County, Auburn, September 13, 1891 (*Atkinson*).
Texas.

Melasmia gleditschiae E. & E.
Ala. Bull. 174, as *Leptostroma hypophyllum* B. & Rav. Cornell Bull. 35.
On leaves of *Gleditsia triacanthos*. Lee County, Auburn, autumn, 1889 (*Atkinson*). Lee County, November, 1895 (*Underwood*).
Louisiana, Ohio.

Melasmia quercuum Atkinson.
Cornell Bull. 34.
On leaves of *Quercus phellos*. Lee County, Auburn (*Atkinson*).

Melasmia setariae Atkinson.
Cornell Bull. 34.
On *Chaetochloa* (*Setaria*) *glauca*. Lee County, Auburn, September 27–29, 1891 (*Atkinson*).

DISCOSIA Lib.

Discosia artocreas (Tode) Fr.
Grevillea, 3:6. Peters coll. Ala. Bull. 173. Cornell Bull. 34.
On *Aralia spinosa* (*Peters*).
On Fagus (*Beaumont*).
On Ilex (*Beaumont*).
On dead leaves of *Prunus serotina*. Lee County, Auburn, July 31, 1891 (*Duggar*).
On leaves of *Acer rubrum*. Lee County, July 22, 1891 (*Atkinson*).

Discosia fagina Lib.
Grevillea, 3:7. Ala. Bull. 173.
(*Beaumont.*)

Discosia minima B. & C.
Grevillea, 3:7. Ala. Bull. 173.
On leaves of *Ilex* sp. (*Beaumont*).
On *Ilex opaca*. Lee County, July, 1896 (*Underwood & Earle*).

Discosia rugulosa (B. & C.).
Grevillea, 3:7. Peters coll. 1, 1855. Ala. Bull. 173. Cornell Bull. 34.
On leaves of Hicoria (*Peters*)
On *Hicoria orata*. Lee County, July, 1891 (*Newman*).

ENTOMOSPORIUM Lév.

Entomosporium maculatum Lev.

Ala. Bull. 174. Cornell Bull. 34.

On living leaves of *Cydonia vulgaris*. Lee County, Gold Hill, September, 1890 (*Atkinson*). Washington County, July, 1896 (*Earle*).

On a cultivated species of Amelanchier. Lee County, July, 1896 (*Underwood & Earle*).

LEPTOSTROMELLA Sacc.

Leptostromella filicina (B. & C.) Sacc.

Grevillea, **2**: 84, under Cryptosporium. Ala. Bull. 174.

On dead ferns (*Peters*).

Pennsylvania.

LEPTOTHYRIUM Kunze & Schum.

Leptothyrium dryinum Sacc.

Ala. Bull. 174. Cornell Bull. 34.

On living leaves of *Castanea pumila*. Lee County, August 11, 1890 (*Atkinson*).

On leaves of *Hicoria alba*. Lee County, July 24, 1891 (*Duggar & Newman*).

On *Nyssa sylvatica*. Lee County, 1892 (*Richards*).

Leptothyrium lychnidis B. & C.

Grevillea, **2**: 83. Ala. Bull. 174.

On *Lychnis flos cuculi*[1] (*Peters*).

Leptothyrium cylindrium Atkinson.

Cornell Bull. 34.

On leaves of *Arundinaria tecta*. Lee County, Auburn, autumn, 1889 (*Atkinson*).

Family EXCIPULACEAE.

AMEROSPORIUM Speg.

Amerosporium oeconomicum Ell. & Tracy.

Ala. Bull. 175. Cornell Bull. 33.

On *Vigna catjang*. Lee County, Auburn, July 22, 1890 (*Atkinson*); October 1, 1891 (*Duggar*).

DOTHICHIZA Lib.

Dothichiza serotina Atkinson.

Cornell Bull. 33.

On leaves of *Prunus serotina*. Lee County, Auburn (*Atkinson*).

SCHIZOTHYRELLA Thuem.

Schizothyrella hystercides Atkinson.

Cornell Bull. 33.

On dead culms of *Chrysopogon arenaceus*. Lee County, Auburn, November 1, 1891 (*Duggar*).

---

[1] This host belongs undoubtedly to another species, *Lychnis flos-cuculi* not being known from Alabama. (Mohr.)

Geographical distribution of the fungi of Alabama.

Order.	Family.	Genera.	Species.	Southern. Austroriparian, or Louisianian area.	Northern. Carolinian and Alleghenian areas.	Europe.	Other countries.
CLASS PHYCOMYCETES.							
Chytridiales	Synchytriaceae	1	3	.....	3	.....	.....
Mucorales	Mucoraceae	2	2	.....	2	2	.....
Saprolegniales	Saprolegniaceae	2	5	3	2	2	.....
Peronosporales	Albuginaceae	1	5	7	15	.....	.....
	Peronosporaceae	4	17				
Entomophthorales	Entomophthoraceae.	1	2	.....	2	1	.....
CLASS ASCOMYCETES.							
Exoascales	Exoascaceae	2	10	.....	.....	.....	.....
Helvellales	Geoglossaceae	3	3	4	2	4	2 (South America.)
	Helvellaceae	1	1				
	Rhizinaceae	2	2				
Pezizales	Pezizaceae	5	16	14	39	12	.....
	Ascobolaceae	1	1				
	Helotiaceae	9	15				
	Mollisiaceae	5	5				
	Celidiaceae	1	2				
	Patellariaceae	3	3				
	Cenangiaceae	5	10				
Phacidiales	Stictidaceae	1	1	12	4	.....	.....
	Tryblidiaceae	2	3				
	Phacidiaceae	4	12				
Hysteriales	Hypodermataceae	4	9	26	5	2	.....
	Dichaenaceae	1	2				
	Hysteriaceae	7	19				
	Acrospermaceae	1	1				
Plectascales	Aspergillaceae	2	9	8	1	.....	.....
Perisporiales	Erysibaceae	6	26	28	10	6	.....
	Perisporiaceae	6	7				
	Microthyriaceae	2	5				
Hypocreales	Hypomycetaceae	2	5	21	3	1	.....
	Melanosporaceae	1	1				
	Nectriaceae	4	9				
	Hypocreaceae	1	6				
	Clavicipitaceae	3	4				
Dothideales	Dothideaceae	7	15	.....	.....	.....	.....
Sphaeriales	Chaetomiaceae	1	2	78	43	30	2 (Cuba.)
	Sphaeriaceae	5	9				
	Ceratostomataceae	2	2				
	Cucurbitariaceae	1	1				
	Amphisphaeriaceae	2	2				
	Lophiostomataceae.	1	1				
	Mycosphaerellaceae.	2	7				
	Pleosporaceae	9	27				
	Massariaceae	2	2				
	Gnomoniaceae	1	1				
	Clypeosphaeriaceae.	3	4				
	Valsaceae	3	9				
	Melanconidaceae	2	3				
	Diatrypaceae	2	11				
	Melogrammataceae.	2	2				
	Xylariaceae	7	38				
CLASS BASIDIOMYCETES.							
Ustilaginales	Ustilaginaceae	3	11	9	5	Cosmopolitan.	.....
	Tilletiaceae	2	3				
Uredinales	Melampsoraceae	4	12	56	57	Largely cosmopolitan.	.....
	Pucciniaceae	8	101				
Auriculariales	Auriculariaceae	1	3	3	2	2	.....
	Pilacraceae	1	2				
Tremellales	Tremellaceae	3	10	4	6	.....	.....
Dacryomycetales	Dacryomycetaceae	3	11	7	41	.....	.....
Exobasidiales	Exobasidiaceae	2	5	2	3	.....	.....

Geographical distribution of the fungi of Alabama—Continued.

Order.	Family.	Genera.	Species.	Southern. Austroriparian, or Louisianian area.	Northern. Carolinian and Alleghenian areas.	Europe.	Other countries.
CLASS BASIDIOMYCETES—Continued.							
Hymeniales	Hypochnaceae	1	1	1			
	Thelephoraceae	8	70	27	43	10	
	Clavariaceae	2	12	5	7	4	
	Hydnaceae	8	43	21	22	21	
	Polyporaceae	15	138	81	56	32	
	Agaricaceae	39	185	89	97	80	
Phallales	Phallaceae	3	4	1	3	1	
	Clathraceae	1	1				
Hymenogastrales	Hymenogastraceae.	2	3	3		2	
Lycoperdales	Lycoperdaceae	9	36	11	25	7	2
Nidulariales	Nidulariaceae	3	4	2	2	2	
Sclerodermatales	Sclerodermataceae	4	8	1	7	5	
(FUNGI IMPERFECTI.)							
Moniliales	Moniliaceae	13	23	202			
	Dematiaceae	19	148				
	Stilbaceae	3	5				
	Tuberculariaceae	10	30				
Melanconiales	Melanconiaceae	10	35	35			
Sphaeropsidales	Sphaeropsidaceae	18	106				
	Zythiaceae	1	1				
	Leptostromataceae	6	14				
	Excipulaceae	3	3				

SUMMARY.

Classes, 4. Orders, 30. Families, 80. Genera, 352. Species, 1,385. Of a more southern distribution from the Louisianian to the Carolinian area, 761 species. Of a more northern distribution to the Alleghenian area, 507 species. In common with Europe, 212 species.

LICHENS.

Thanks to the efforts of the late Messrs. Thomas M. Peters of Moulton and Joseph F. Beaumont of Conecuh County, the lichens of northern Alabama and of the upper part of the Maritime Pine belt in the southern section of the State have become well known. These enthusiastic explorers of its cryptogamic flora communicated the results of their field work to Professor Tuckerman. In the Genera Lichenum (1872) and in the Synopsis Lichenum (1882), this author credited 223 species and 2 varieties to the above collectors. Fully one-half of this number are contained in the collection of lichens made by the Honorable Judge Peters, which he presented to the University of Alabama. The lichens collected by the writer in Mobile and Baldwin counties (early in the seventies) have been identified by Mr. Henry Willey of New Bedford and Miss Maria Wilson, and the collections made in later years in the different parts of the State have been examined by Miss Clara E. Cummings of Wellesley College, who has also kindly undertaken the revision of the catalogue of Alabama lichens, for which assistance the writer expresses here his thanks. Lately an interesting contribution to our knowledge of Alabama lichens has been made by the biological survey of Alabama, consisting of 74 species, mostly from

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● № 5 ● 1967

БОТАНИКА

НЕКОТОРЫЕ ДАННЫЕ О МИКОФЛОРЕ РИЗОСФЕРЫ РАСТЕНИЙ НА ПОБЕРЕЖЬЕ БЕЛОГО МОРЯ

Е. С. Лисина, Р. А. Максимова

В настоящей статье приведены сведения о видовом составе и антагонистических свойствах почвенных грибов, выделенных из ризосферы некоторых растений, произрастающих на побережье Белого моря.

Материалом для исследования послужили почвенные образцы, собранные в районе биостанции Московского университета, расположенной на северном берегу полуострова Киндо в Кандалакшском заливе Белого моря, в 2 *км* к северу от Полярного круга.

Образцы отбирали из верхнего горизонта почвы в ризосфере лишайников, мхов, а также представителей семейств бобовых, злаковых, толстянковых и пасленовых. Почвенную суспензию высевали на чашки Петри со средой Чапека, подкисленной до pH 5,5—6,0. Все выделенные грибы определяли до вида. Антагонистические свойства грибов исследовали методом агаровых блоков по отношению к следующим тест-организмам: Staphylococcus aureus 209, Escherichia coli, Neurospora sitophila, Saccharomyces cerevisiae.

Наибольшее количество зачатков грибов встречается в ризосфере высших растений, относящихся к семействам пасленовых (910 000 на 1 *г* почвы) и бобовых (137 000). Несколько меньше в ризосфере толстянковых (125 000) и злаковых (106 300). Еще меньше зачатков грибов в субстратах из-под нижней части таллома лишайников (10 600) и мхов (32 300). По мере увеличения содержания органических веществ в почвах число грибов в ризосфере растений возрастает. Наибольшее число грибных зачатков обнаружено в ризосфере картофеля на огородной почве.

Данные, приведенные в таблице 1, свидетельствуют о некоторой приуроченности грибов к ризосфере растений определенных типов и семейств. Так, грибы рода Penicillium секции Monoverticillata, имеющие простое морфологическое строение, чаще встречаются под мхами, лишайниками и растениями из семейства толстянковых (наиболее характерны виды Penicillium frequentans Westling и P. thomii Maire). Грибы рода Penicillium секции Asymmetrica—Divaricata, имеющие более сложную морфологическую организацию, чаще встречаются в ризосфере растений семейства бобовых. Грибы рода Fusarium типичны для ризосферы высших растений, особенно для представителей семейства злаковых. Представителей других групп и родов несовершенных грибов выделяли из ризосферы всех исследованных растений. Наиболее многочисленны эти грибы в ризосфере высших растений и особенно растений семейства пасленовых (картофель, растущий на удобренных огородных почвах) и злаковых.

Распределение почвенных грибов в ризосфере растений

Род, секция, подсекция, вид гриба	Число зачатков грибов в ризо							
	мхов		лишайников		бобовых		злаковых	
	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почв
Род Penicillium Link								
Секция Monoverticillata								
P. sclerotiorum van Beyma	3,5	$7 \cdot 10^2$	6,1	$11 \cdot 10^2$	—	—	7,5	$5 \cdot 10$
P. thomii Maire	15,2	$16 \cdot 10^3$	3,5	$33 \cdot 10^2$	—	—	2,6	$5 \cdot 10$
P. frequentans Westling	25,5	$95 \cdot 10^2$	15,7	$13 \cdot 10^2$	—	—	1,0	$1 \cdot 10$
P. decumbens Thom	0,2	$2 \cdot 10^2$	—	—	—	—	—	—
P. spinulosum Thom	—	—	—	—	11,3	$65 \cdot 10^2$	—	—
P. lapidosum Raper and Fen.	—	—	—	—	—	—	—	—
P. javanicum van Beyma	—	—	—	—	—	—	—	—
P. ochraceum Raillo	—	—	—	—	—	—	—	—
Подсекция Asymmetrica — Divaricata								
P. janthinellum Biourge	6,2	33·10	—	—	45,0	$4 \cdot 10^2$	—	—
P. piscarium Westling	4,6	33·10	7	$5 \cdot 10^2$	12,0	$4 \cdot 10^2$	—	—
P. soppii Zaleski	0,8	33·10	—	—	8,0	$1 \cdot 10^4$	—	—
Подсекции Asymmetrica — Velutina и Lanata								
P. corylophilum Dierckx	0,5	$33 \cdot 10^2$	0,8	$16 \cdot 10^2$	—	—	12,5	$5 \cdot 1$
P. aurantio-virens Biourge	5	$16 \cdot 10^2$	—	—	—	—	—	—
P. brevi-compactum Dierckx	—	—	15,0	$5 \cdot 10^2$	—	—	—	—
P. paxili Bainier	—	—	0,5	33	—	—	—	—
P. stoloniferum Thom	—	—	—	—	—	—	—	—
Подсекция Asymmetrica — Fasciculata								
P. chermisinum Biourge	—	—	—	—	—	—	—	—
P. viridicatum Westling	3	2·10	—	—	—	—	—	—
P. cyclopium Westling	—	—	0,9	2·10	—	—	—	—
P. claviforme Bainier	0,7	$5 \cdot 10^2$	—	—	—	—	—	—

LISINA, E.S. & MAKSIMOVA, R.A.

Nekotoryye dannyye o mikoflore rizosfery rasteni na poberezh'e Belogo Morya. [Some data on the mycoflora of the plant rhizosphere on the White Sea coast.]

Biol. Nauki, 10 (5): 84-87. [2 tables.]

Microfilm no. 14791

1967

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● № 5 ● 1967

БОТАНИКА

НЕКОТОРЫЕ ДАННЫЕ О МИКОФЛОРЕ РИЗОСФЕРЫ РАСТЕНИЙ НА ПОБЕРЕЖЬЕ БЕЛОГО МОРЯ

Е. С. Лисина, Р. А. Максимова

В настоящей статье приведены сведения о видовом составе и антагонистических свойствах почвенных грибов, выделенных из ризосферы некоторых растений, произрастающих на побережье Белого моря.

Материалом для исследования послужили почвенные образцы, собранные в районе биостанции Московского университета, расположенной на северном берегу полуострова Киндо в Кандалакшском заливе Белого моря, в 2 *км* к северу от Полярного круга.

Образцы отбирали из верхнего горизонта почвы в ризосфере лишайников, мхов, а также представителей семейств бобовых, злаковых, толстянковых и пасленовых. Почвенную суспензию высевали на чашки Петри со средой Чапека, подкисленной до pH 5,5—6,0. Все выделенные грибы определяли до вида. Антагонистические свойства грибов исследовали методом аграровых блоков по отношению к следующим тест-организмам: Staphylococcus aureus 209, Escherichia coli, Neurospora sitophila, Saccharomyces cerevisiae.

Наибольшее количество зачатков грибов встречается в ризосфере высших растений, относящихся к семействам пасленовых (910 000 на 1 *г* почвы) и бобовых (137 000). Несколько меньше в ризосфере толстянковых (125 000) и злаковых (106 300). Еще меньше зачатков грибов в субстратах из-под нижней части таллома лишайников (10 600) и мхов (32 300). По мере увеличения содержания органических веществ в почвах число грибов в ризосфере растений возрастает. Наибольшее число грибных зачатков обнаружено в ризосфере картофеля на огородной почве.

Данные, приведенные в таблице 1, свидетельствуют о некоторой приуроченности грибов к ризосфере растений определенных типов и семейств. Так, грибы рода Penicillium секции Monoverticillata, имеющие простое морфологическое строение, чаще встречаются под мхами, лишайниками и растениями из семейства толстянковых (наиболее характерны виды Penicillium frequentans Westling и P. thomii Maire). Грибы рода Penicillium секции Asymmetrica—Divaricata, имеющие более сложную морфологическую организацию, чаще встречаются в ризосфере растений семейства бобовых. Грибы рода Fusarium типичны для ризосферы высших растений, особенно для представителей семейства злаковых. Представителей других групп и родов несовершенных грибов выделяли из ризосферы всех исследованных растений. Наиболее многочисленны эти грибы в ризосфере высших растений и особенно растений семейства пасленовых (картофель, растущий на удобренных огородных почвах) и злаковых.

Таблица 1

Распределение почвенных грибов в ризосфере растений

Род, секция, подсекция, вид гриба	Число зачатков грибов в ризосфере											
	мхов		лишайников		бобовых		злаковых		толстянковых		пасленовых	
	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы
Род Penicillium Link												
Секция Monoverticillata												
P. sclerotiorum van Beyma	3,5	$7 \cdot 10^2$	6,1	$11 \cdot 10^2$	—	—	7,5	$5 \cdot 10^2$	—	—	—	—
P. thomii Maire	15,2	$16 \cdot 10^3$	3,5	$33 \cdot 10^2$	—	—	2,6	$5 \cdot 10^2$	—	—	—	—
P. frequentans Westling	25,5	$95 \cdot 10^2$	15,7	$13 \cdot 10^2$	—	—	1,0	$1 \cdot 10^3$	—	—	—	—
P. decumbens Thom	0,2	$2 \cdot 10^2$	—	—	—	—	—	—	17,70	$15 \cdot 10^3$	—	—
P. spinulosum Thom	—	—	—	—	11,3	$65 \cdot 10^2$	—	—	—	—	—	—
P. lapidosum Raper and Fen.	—	—	—	—	—	—	—	—	17,90	$3 \cdot 10^3$	—	—
P. javanicum van Beyma	—	—	—	—	—	—	—	—	23,60	$4 \cdot 10^4$	—	—
P. ochraceum Raillo	—	—	—	—	—	—	—	—	4,0	$3 \cdot 10^2$	7,8	$2 \cdot 10^3$
Подсекция Asymmetrica — Divaricata												
P. janthinellum Biourge	6,2	33·10	—	—	45,0	$4 \cdot 10^2$	—	—	11,80	$5 \cdot 10^3$	—	—
P. piscarium Westling	4,6	33·10	7	$5 \cdot 10^2$	12,0	$4 \cdot 10^2$	—	—	—	—	—	—
P. soppii Zaleski	0,8	33·10	—	—	8,0	$1 \cdot 10^4$	—	—	—	—	—	—
Подсекции Asymmetrica — Velutina и Lanata												
P. corylophilum Dierckx	0,5	$33 \cdot 10^2$	0,8	$16 \cdot 10^2$	—	—	12,5	$5 \cdot 10^2$	—	—	—	—
P. aurantio-virens Biourge	5	$16 \cdot 10^2$	—	—	—	—	—	—	—	—	—	—
P. brevi-compactum Dierckx	—	—	15,0	$5 \cdot 10^2$	—	—	—	—	10,0	$5 \cdot 10^2$	—	—
P. paxili Bainier	—	—	0,5	33	—	—	—	—	—	—	—	—
P. stoloniferum Thom	—	—	—	—	—	—	—	—	10,0	$1 \cdot 10^3$	—	—
Подсекция Asymmetrica — Fasciculata												
P. chermisinum Biourge	—	—	—	—	—	—	—	—	—	—	11,5	$3 \cdot 10^4$
P. viridicatum Westling	3	2·10	—	—	—	—	—	—	—	—	—	—
P. cyclopium Westling	—	—	0,9	2·10	—	—	—	—	—	—	7,8	$2 \cdot 10^4$
P. claviforme Bainier	0,7	$5 \cdot 10^2$	—	—	—	—	—	—	—	—	—	—

Продолжение таблицы 1

Род, секция, подсекция, вид гриба	Число зачатков грибов в ризосфере											
	мхов		лишайников		бобовых		злаковых		толстянковых		пасленовых	
	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы	%	абс. на 1 г почвы
Секция Biverticillata — Symmetrica												
P. funiculosum Thom	11,1	$55 \cdot 10$	—	—	—	—	—	—	—	—	—	—
P. novae-zeelandiae van Beyma	3,5	$5 \cdot 10^2$	—	—	—	—	—	—	—	—	—	—
Род Fusarium Link												
F. sambucinum Fuck.	—	—	5,6	$4,3 \cdot 10^2$	1	$5 \cdot 10^3$	—	—	—	—	—	—
F. expansum Schlecht	—	—	1,4	3	—	—	—	—	—	—	—	—
F. culmorum (W. G. Sm.) Sacc.	—	—	—	—	2,5	$5 \cdot 10^3$	—	—	—	—	—	—
F. solani (Mart.) App. et Wr.	—	—	—	—	—	—	11,5	$5 \cdot 10^2$	—	—	—	—
F. avenaceum (Fr.) Sacc.	—	—	—	—	—	—	10,5	$15 \cdot 10$	—	—	—	—
Fungi imperfecti												
Trichoderma viride Pers.	2	$88 \cdot 10$	6,7	$5 \cdot 10^2$	10	$2 \cdot 10^4$	4,7	$13 \cdot 10^3$	—	—	—	—
Hormodendrum hordei Bruhne	5,8	$9 \cdot 10^3$	6	$85 \cdot 10$	—	—	28,6	$55 \cdot 10^3$	—	—	23,0	$6 \cdot 10^4$
Cephalosporium humicola Oudem	—	—	—	—	10	$5 \cdot 10^3$	—	—	—	—	—	—
Isaria sp.	—	—	—	—	—	—	—	—	—	—	33,0	$62 \cdot 10^4$
Alternaria tenuis Nees	10,2	$2 \cdot 10^3$	10,7	$2 \cdot 10^3$	—	—	21,2	$17 \cdot 10^3$	5,8	$1 \cdot 10^3$	—	—
Класс Ascomycetes												
Chaetomium comatum (Tode) Fries	2,5	$13 \cdot 10$	2,4	$33 \cdot 10$	—	—	—	—	—	—	—	—
Класс Phycomycetes												
Mucor racemosus Fresen	—	—	—	—	—	—	—	—	—	—	13,8	$2 \cdot 10^4$
Mycelia sterilia	—	—	17,9	$11 \cdot 10^2$	—	—	—	—	—	—	2	$1 \cdot 10^4$

Исследование антибиотической активности выделенных штаммов грибов показало, что наибольшее число активных форм встречается среди грибов, выделенных из ризосферы высших растений (табл. 2).

Таблица 2

Антибиотическая активность грибов, выделенных из ризосферы растений

Растения	Число форм грибов, % от общего числа антагонистов, по отношению к							Общее число активных форм, %
	Staphylococcus aureus 209	Escherichia coli	Neurospora sitophila	St. aureus 209+ +E. coli	St. aureus 209+ +N. sitophila	N. sitophila+ +E. coli	St. aureus 209+ +E.coli+N.sitophila	
Мхи	15,5	25,0	56,0	5,5	—	16	—	20,2
Лишайники	36,0	—	65,0	—	16,0	—	—	23,4
Бобовые	86,3	13,0	86,3	—	—	—	13	39,5
Злаковые	67,0	—	34,3	—	15,4	—	—	42,2
Толстянковые	63,0	27,0	40,0	27,0	—	—	—	29,7
Пасленовые	58,0	8,4	62,2	8,4	12,5	—	—	92,6

Среди грибов, выделенных из-под мхов и лишайников, число активных форм оказалось наименьшим. При этом антибиотическая активность проявилась в основном по отношению к Neurospora sitophila. Изученные штаммы грибов имеют довольно узкий спектр антибиотического действия. Многие грибы проявляют только противогрибковую активность. Наибольшее число штаммов с широким спектром антибиотического действия, т. е. активных по отношению ко всем испытанным тест-организмам, обнаружено в ризосфере растений семейства бобовых. Единичные формы грибов показали активность по отношению к грамотрицательной бактерии Escherichia coli. Форм, активных против Saccharomyces cerevisiae, не обнаружено.

В заключение можно отметить, что в ризосфере исследованных растений, произрастающих в районе Беломорской биостанции, содержится небольшое число зачатков грибов. Наиболее часто встречающиеся формы относятся к роду Penicillium, секции Monoverticillata. Среди изученных грибов сравнительно мало антагонистов. По-видимому, это связано с малочисленностью микроорганизмов и ослаблением микробиологических процессов в северных почвах.

Рекомендована лабораторией антибиотиков Московского государственного университета им. М. В. Ломоносова

Поступила
19 февраля 1965 г.

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● № 5 ● 1967

МИКРОБИОЛОГИЯ И ВИРУСОЛОГИЯ

ИНАКТИВАЦИЯ ТРИХОТЕЦИНА ГРИБАМИ

I. СПОСОБНОСТЬ ГРИБОВ ИЗ РАЗЛИЧНЫХ ГРУПП ИНАКТИВИРОВАТЬ ТРИХОТЕЦИН

И. И. Сидорова

Трихотецин — антибиотик, используемый в растениеводстве. Применение его дало положительные результаты в опытах по борьбе с некоторыми болезнями растений (М. Станек, 1962; С. П. Мокротоваров, 1962; М. А. Манучарян, 1964; H. Darpoux, M. Arnoux, 1957). В Венгрии он используется для сухого протравливания семян пшеницы против твердой головни и опрыскивания вишни против монилиоза (J. Vörös, 1955; Г. Убрижи, И. Вереш, 1962). Одно из достоинств этого антибиотика — его высокая стабильность в различных условиях: в водных растворах трихотецин не теряет активности при pH 1,0—10,0; при нейтральной реакции раствора он выдерживает нагревание при температуре 100° С в течение часа и стерилизацию (G. Freeman, R. Morrison, 1949; D. Hessayon, 1951).

Однако, кроме деградации под воздействием физических и физико-химических факторов, возможна биологическая инактивация антибиотических веществ. В ряде случаев она обусловлена присутствием продуктов метаболизма микроорганизмов (J. Stanecki a. oth., 1958). В литературе имеются данные о разложении микроорганизмами стрептомицина (D. Klein, D. Pramer, 1961), тетрациклинов (S. Iyer a. oth., 1954; E. Meyers, D. Smith, 1962), актиномицина (E. Katz, P. Pienta, 1957), аскохитина (H. Oku, T. Nakanishi, 1964) и других антибиотиков. Хорошо изучено разложение пенициллинов грамположительными и грамотрицательными бактериями, образующими пенициллиназу (β-лактамазу) (E. Abraham, E. Chain, 1940; С. М. Чайковская, 1963; I. Smith, J. Hamilton-Miller, 1963; G. Schumacher, 1963; L. Sabath, M. Finland, 1963). Антибиотики этой группы могут расщепляться и другим ферментом — пенициллин-амидазой с образованием 6-аминопенициллановой кислоты (C. Claridge a. oth., 1960). Цефалоспорины инактивируются некоторыми бактериями и актиномицетами как в результате гидролиза β-лактамного кольца молекулы, так и в результате ее деацетилирования (A. Demain a. oth., 1963; G. Ayliffe, 1965). Образование пенициллиназы и цефалоспориназы играет известную роль в определении устойчивости некоторых микроорганизмов к пенициллинам и цефалоспоринам (A. Percival a. oth., 1963; G. Ayliffe, 1963).

Уменьшение активности трихотецина при внесении его в почву было впервые отмечено Хессайоном (D. Hessayon, 1953). На основании

SIDOROVA, I.I. 1967

Inaktivatsiya trikhotetsina gribami. I. Sposobnost' gribov iz razlichnykh grupp inaktivirovat' trikhotetsin. [Inactivation of trichothecin by fungi. I. Capacity of fungi of various groups to inactivate trichothecin.]

Biol. Nauki, 10 (5): 128-133. [3 graphs, 2 tables.]

Microfilm no. 14195

A. niger, изученные авторами [illegible] rasiticus Speare и P. urticae Bain. не продуцировали трихотециназы.

Имеющиеся в литературе данные не позволяют сделать заключение о том, какие представители различных групп грибов, в частности фитопатогенных, способны инактивировать трихотецин и может ли это свойство грибов играть заметную отрицательную роль при использовании трихотецина в практике защиты растений. Поэтому мы попытались изучить возможность инактивации трихотецина грибами из различных систематических и экологических групп, связь между образованием трихотециназы и устойчивостью к антибиотику, а также условия и механизм инактивации.

Материалом для исследования служили 55 штаммов грибов, относящиеся к 47 видам из классов Phycomycetes, Ascomycetes, Basidiomycetes и Fungi imperfecti (табл. 1). У всех культур определяли чувствительность к трихотецину методом серийных разведений с использованием агаризованной среды и способность инактивировать этот антибиотик.

Грибы выращивали в колбах на круговых качалках при 200 *об/мин* на средах Сабуро (дрожжи), Чапека — Докса (штаммы из родов Aspergillus, Penicillium и Fusarium) и Чапека — Докса с добавлением 0,5%-ного кукурузного экстракта по сухому весу (для остальных штаммов). Одновременно ставили две серии опытов: в первой к 48-часовой культуре грибов добавляли трихотецин в субфунгистатической концентрации для индуцирования синтеза фермента, во второй использовали неиндуцированные культуры. Для определения инактивации трихотецина 72-часовые мицелий и дрожжевые клетки отделяли от культуральной жидкости центрифугированием, трижды промывали стерильной дистиллированной водой и суспендировали в 100 *мл* 0,1*M* фосфатного буфера (pH 7,0). Суспензии и культуральные жидкости смешивали с раствором трихотецина (концентрация 700 *мкг/мл*) в отношении 1 : 1, колбы со смесью помещали в аппарат для встряхивания. Содержание антибиотика определяли через каждые 2 *ч* в течение первых 12 *ч*, через 24, 48 и 72 *ч* после начала опыта методом диффузии в агаре; в качестве тестобъекта использовали Saccharomyces cerevisiae Meyen XII р № 46. Контролем служил раствор трихотецина в той же концентрации, что и в опыте.

В работе использовали кристаллический трихотецин, полученный из лаборатории антибиотиков Московского университета.

У всех изученных грибов фермент связан с клетками; культуральный фильтрат не обладает ферментативной активностью. Разложение антибиотика наблюдалось только в серии опытов с использованием мицелия, обработанного предварительно антибиотиком в субфунгистатической концентрации (табл. 1).

Как видно из таблицы, способностью инактивировать трихотецин обладает большое число изученных штаммов (61,9%). Наиболее активно разлагали антибиотик штаммы из родов Aspergillus, Penicillium и Fusarium, большинство которых является почвенными сапрофитами. У фитопатогенных грибов, высоко чувствительных к трихотецину, — Ре-

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● № 5 ● 1967

МИКРОБИОЛОГИЯ И ВИРУСОЛОГИЯ

ИНАКТИВАЦИЯ ТРИХОТЕЦИНА ГРИБАМИ

I. СПОСОБНОСТЬ ГРИБОВ ИЗ РАЗЛИЧНЫХ ГРУПП ИНАКТИВИРОВАТЬ ТРИХОТЕЦИН

И. И. Сидорова

Трихотецин — антибиотик, используемый в растениеводстве. Применение его дало положительные результаты в опытах по борьбе с некоторыми болезнями растений (М. Станек, 1962; С. П. Мокротоваров, 1962; М. А. Манучарян, 1964; H. Darpoux, M. Arnoux, 1957). В Венгрии он используется для сухого протравливания семян пшеницы против твердой головни и опрыскивания вишни против монилиоза (J. Vörös, 1955; Г. Убрижи, И. Вереш, 1962). Одно из достоинств этого антибиотика — его высокая стабильность в различных условиях: в водных растворах трихотецин не теряет активности при pH 1,0—10,0; при нейтральной реакции раствора он выдерживает нагревание при температуре 100° С в течение часа и стерилизацию (G. Freeman, R. Morrison, 1949; D. Hessayon, 1951).

Однако, кроме деградации под воздействием физических и физико-химических факторов, возможна биологическая инактивация антибиотических веществ. В ряде случаев она обусловлена присутствием продуктов метаболизма микроорганизмов (J. Stanecki a. oth., 1958). В литературе имеются данные о разложении микроорганизмами стрептомицина (D. Klein, D. Pramer, 1961), тетрациклинов (S. Iyer a. oth., 1954; E. Meyers, D. Smith, 1962), актиномицина (E. Katz, P. Pienta, 1957), аскохитина (H. Oku, T. Nakanishi, 1964) и других антибиотиков. Хорошо изучено разложение пенициллинов грамположительными и грамотрицательными бактериями, образующими пенициллиназу (β-лактамазу) (E. Abraham, E. Chain, 1940; С. М. Чайковская, 1963; I. Smith, J. Hamilton-Miller, 1963; G. Schumacher, 1963; L. Sabath, M. Finland, 1963). Антибиотики этой группы могут расщепляться и другим ферментом — пенициллин-амидазой с образованием 6-аминопенициллановой кислоты (C. Claridge a. oth., 1960). Цефалоспорины инактивируются некоторыми бактериями и актиномицетами как в результате гидролиза β-лактамного кольца молекулы, так и в результате ее деацетилирования (A. Demain a. oth., 1963; G. Ayliffe, 1965). Образование пенициллиназы и цефалоспориназы играет известную роль в определении устойчивости некоторых микроорганизмов к пенициллинам и цефалоспоринам (A. Percival a. oth., 1963; G. Ayliffe, 1963).

Уменьшение активности трихотецина при внесении его в почву было впервые отмечено Хессайоном (D. Hessayon, 1953). На основании

изучения инактивации антибиотика в стерильной и нестерильной почве он пришел к заключению, что ее причиной является адсорбция вещества, а не его биологическое разложение. Однако в том же году была опубликована работа Дарпу и Февр-Амио (H. Darpoux, A. Faivre-Amiot, 1953), установивших, что некоторые штаммы почвенных грибов Aspergillus niger van Tiegh. и Penicillium notatum Westl. способны инактивировать трихотецин при росте как на синтетических средах, так и в стерильной почве. Инактивация трихотецина и близкого к нему антибиотика кротоцина штаммом Penicillium chrysogenum Thom изучена Хорватом и Варгой (J. Horvath, J. Varga, 1961, 1962). Установлен энзиматический характер инактивации антибиотиков; фермент, получивший наименование трихотециназы, является индуктивным и относится к группе эстераз. Ферментной активностью, по данным Хорвата и Варги, обладает только интактный мицелий; бесклеточные препараты, полученные дезинтеграцией мицелия ультразвуком, растиранием со стеклянным порошком или окисью алюминия, неактивны. Кроме P. chrysogenum, способностью гидролизовать трихотецин и кротоцин обладает один штамм A. niger; изученные авторами культуры A. oryzae (Ahlb.) Cohn, A. parasiticus Speare и P. urticae Bain. не продуцировали трихотециназы.

Имеющиеся в литературе данные не позволяют сделать заключение о том, какие представители различных групп грибов, в частности фитопатогенных, способны инактивировать трихотецин и может ли это свойство грибов играть заметную отрицательную роль при использовании трихотецина в практике защиты растений. Поэтому мы попытались изучить возможность инактивации трихотецина грибами из различных систематических и экологических групп, связь между образованием трихотециназы и устойчивостью к антибиотику, а также условия и механизм инактивации.

Материалом для исследования служили 55 штаммов грибов, относящиеся к 47 видам из классов Phycomycetes, Ascomycetes, Basidiomycetes и Fungi imperfecti (табл. 1). У всех культур определяли чувствительность к трихотецину методом серийных разведений с использованием агаризованной среды и способность инактивировать этот антибиотик.

Грибы выращивали в колбах на круговых качалках при 200 *об/мин* на средах Сабуро (дрожжи), Чапека — Докса (штаммы из родов Aspergillus, Penicillium и Fusarium) и Чапека — Докса с добавлением 0,5%-ного кукурузного экстракта по сухому весу (для остальных штаммов). Одновременно ставили две серии опытов: в первой к 48-часовой культуре грибов добавляли трихотецин в субфунгистатической концентрации для индуцирования синтеза фермента, во второй использовали неиндуцированные культуры. Для определения инактивации трихотецина 72-часовые мицелий и дрожжевые клетки отделяли от культуральной жидкости центрифугированием, трижды промывали стерильной дистиллированной водой и суспендировали в 100 *мл* 0,1*М* фосфатного буфера (pH 7,0). Суспензии и культуральные жидкости смешивали с раствором трихотецина (концентрация 700 *мкг/мл*) в отношении 1 : 1, колбы со смесью помещали в аппарат для встряхивания. Содержание антибиотика определяли через каждые 2 *ч* в течение первых 12 *ч*, через 24, 48 и 72 *ч* после начала опыта методом диффузии в агаре; в качестве тестобъекта использовали Saccharomyces cerevisiae Meyen XII р № 46. Контролем служил раствор трихотецина в той же концентрации, что и в опыте.

В работе использовали кристаллический трихотецин, полученный из лаборатории антибиотиков Московского университета.

У всех изученных грибов фермент связан с клетками; культуральный фильтрат не обладает ферментативной активностью. Разложение антибиотика наблюдалось только в серии опытов с использованием мицелия, обработанного предварительно антибиотиком в субфунгистатической концентрации (табл. 1).

Как видно из таблицы, способностью инактивировать трихотецин обладает большое число изученных штаммов (61,9%). Наиболее активно разлагали антибиотик штаммы из родов Aspergillus, Penicillium и Fusarium, большинство которых является почвенными сапрофитами. У фитопатогенных грибов, высоко чувствительных к трихотецину, — Ре-

Таблица 1

Инактивация трихотецина интактным мицелием грибов (индуцированные культуры)

Штаммы	Чувствительность к трихотецину, *мкг/мл*	Концентрация трихотецина (индуктора), *мкг/мл*	Инактивация трихотецина за 24 *ч*, % от исходной концентрации
Кл. Phycomycetes			
Mucor rammanianus Moell	80,0	10,0	100
Cunninghamella albida (Sacc.) Matr	40,0	10,0	0
Chaetostylum sp.	50,0	10,0	0
Кл. Ascomycetes			
Rhodotorula rubra (Demme) Lodder 116	1,0	0,5	0
Rh. glutinis (Fres.) Harrison 315	5,0	2,0	0
Rh. flava (Saito) Lodder 319	10,0	5,0	0
Torulopsis terrestris Verona 449	10,0	5,0	0
Saccharomyces carlsbergensis (Hansen) Dekker Logos 37	1,0	0,5	0
S. carlsbergensis 776	5,0	2,0	0
S. cerevisiae Meyen XII p № 46	0,6	0,3	0
Candida utilis Lodder et Kr. C 1	2,0	1,0	0
Kloeckera brevis Lodder 165	2,0	1,0	0
Chaethomium megalocarpum Bain.	20,0	10,0	85
Кл. Basidiomycetes			
Serpula lacrymans (Wulf.) Gray	10,0	5,0	75
Gloeophyllum saepiarium (Wulf. ex Fr.) Karst.	15,0	5,0	60
Paxillus acheruntius Schroet.	25,0	10,0	38
Кл. Fungi imperfecti			
Aspergillus flavus Link ex Fr.	80,0	10,0	100
A. oryzae (Ahlb.) Cohn	50,0	10,0	100
A. fumigatus Fres.	40,0	10,0	100
A. repens (Corda) De Bary	25,0	10,0	18
A. niger van Tiegh. 33	10,0	5,0	100
A. niger 1	10,0	5,0	100
A. niger 66	10,0	5,0	100
A. terreus Thom	25,0	10,0	100
Penicillium chrysogenum Thom 202	20,0	10,0	100
P. chrysogenum A-14	30,0	10,0	100
P. notatum Westl. 491	80,0	10,0	100
P. notatum 177	50,0	10,0	100
P. roqueforti Thom.	25,0	10,0	100
P. italicum Wehm.	15,0	5,0	55
P. cyclopium Westl.	15,0	5,0	100
P. funiculosum Thom 114	80,0	10,0	100
P. funiculosum 298	2,0	1,0	0
P. sp. 684-3	25,0	10,0	100
P. sp. PD	100,0	10,0	100
Cephalosporium acremonium Corda	100,0	10,0	100
Verticillium dahliae Kleb. 39	5,0	2,5	0
V. dahliae 40	7,5	3,0	31
Botrytis cinerea Pers. ex Fr. B—1	20,0	10,0	100
B. cinerea B-3	10,0	5,0	0
Piricularia oryzae Cavara	1,5	0,5	0
Cladosporium herbarum Link ex Fr.	20,0	10,0	100
C. fulvum Cooke	10,0	5,0	14
Fusicladium pirinum (Libert) Fuck.	7,5	3,0	0
F. dendriticum (Wallr.) Fuck.	5,0	2,5	0
Helminthosporium turcicum Pass	10,0	5,0	22
H. rostratum Drechsler	5,0	2,5	0
Deuterophoma tracheiphila Petri	2,5	1,0	0
Trichothecium roseum Link ex Fr. 104	80,0	10,0	100
Sclerotium bataticola Taubenh.	2,5	1,0	0
Fusarium sporotrichiella Bilai.	80,0	10,0	100
F. oxysporum Schlecht. emend. Snyd. et Hans. vasinfectum Atk.	15,0	7,5	100
F. sambucinum Fuck.	40,0	10,0	100
F. avenaceum (Fr.) Sacc.	25,0	10,0	100

nicillium digitatum, Fusicladium dendriticum, Fusicl. pirinum, Sclerotium bataticola и других — трихотециназа не обнаружена; у Helminthosporium turcicum, Verticillium dahliae отмечена слабая ферментативная активность. Дрожжи из родов Rhodotorula, Torulopsis, Saccharomyces, Kloeckera и Candida в условиях опыта не инактивировали антибиотика.

Разные виды в пределах одного рода, а также штаммы одного вида с различной скоростью инактивируют трихотецин. Так, Penicillium sp. PD полностью разлагает антибиотик за 7 *ч*, в то время как культурам P. notatum 177 и P. funiculosum 114 необходимо для этого соответственно 11 и 24 *ч*; штаммы P. funiculosum 298 и P. digitatum 330 не образуют трихотециназы (рис. 1, *А*). У видов из рода Fusarium эти различия выражены в меньшей степени (рис. 1, *Б*). Штаммовые отличия в способности разлагать трихотецин обнаружены у A. niger (рис. 1, *В*), P. funiculosum, Botrytis cinerea, Verticillium dahliae (табл. 1).

Устойчивость изученных грибов к трихотецину во многих случаях коррелировала со способностью к его инактивации; однако некоторые штаммы, устойчивые к этому антибиотику, — Cunninghamella albida и Chaetostylum sp. — в условиях опытов не продуцировали трихотециназы.

У всех изученных штаммов фермент, разлагающий трихотецин, является индуктивным. По-видимому, он предварительно накапливается в мицелии, что позволяет грибам развиваться в растворе антибиотика высокой концентрации. Определение чувствительности к трихотецину у индуцированных и неиндуцированных культур некоторых грибов путем их высева на среду с антибиотиком показало, что после предварительной обработки антибиотиком в субфунгистатической концентрации устойчивость к нему резко повышается (табл. 2). Последнее следует учитывать при практическом применении трихотецина, так как обработка этим препаратом в низкой концентрации может индуцировать образование трихотециназы у паразита и тем самым повысить его устойчивость к антибиотику.

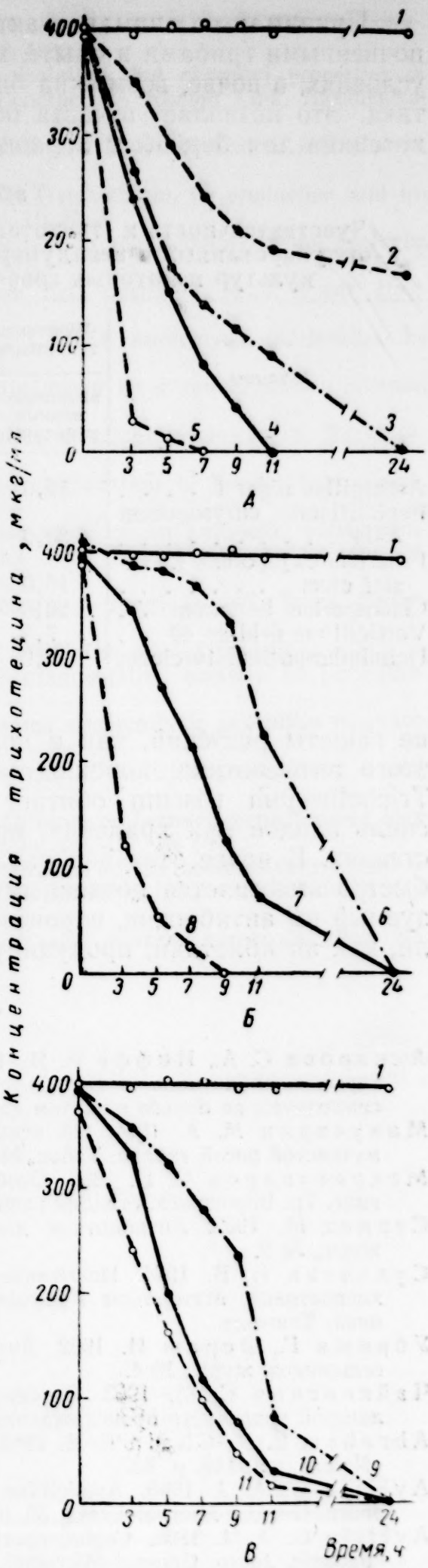

Рис. 1. Инактивация трихотецина некоторыми видами рода Penicillium (*А*), Fusarium (*Б*) и некоторыми штаммами Aspergillus niger (*В*):

1—контроль, *2*—P. italicum, *3*—P. funiculosum 114, *4*—P. notatum 177, *5*—Penicillium sp. PD, *6*—F. oxysporum f. vasinfectum, *7*—F. sambucinum, *8*—F. sporotrichiella, *9*—штамм 66, *10*—штамм 33, *11*—штамм 1

Принимая во внимание активное разложение трихотецина многими почвенными грибами в опыте, можно предположить, что в естественных условиях, в почве, возможна биологическая инактивация этого антибиотика. Это позволяет отчасти объяснить результаты использования трихотецина для борьбы с паразитами растений, обитающими или сохраняющимися в почве или на растительных остатках. Опрыскивание этим антибиотиком надземных частей растений при борьбе с монилиозом вишни или мучнистой росой табака дает стабильные положительные результаты, в то время как опрыскивание или полив растений и внесение трихотецина в почву при борьбе с вертициллезным вилтом хлопчатника не оказывает постоянного эффективного действия по годам (Н. В. Сухачева, 1964; С. А. Аскарова и др., 1964). Результаты применения трихоцетина в практике защиты растений, как и полученные нами данные по инактивации этого антибиотика, хорошо согласуются с экологией его продуцента. Trichothecium roseum обитает на растительных остатках, вызывает гниль плодов при хранении, иногда паразитирует на ослабленных растениях. В почве этот вид распространен ограниченно и, по-видимому, быстро вытесняется почвенными антагонистами (D. Park, 1955); образуемый им антибиотик, вероятно, не играет в почве такой защитной роли, как антибиотики, продуцируемые некоторыми почвенными грибами.

Таблица 2

Чувствительность к трихотецину у индуцированных и неиндуцированных культур некоторых грибов

Штаммы	Чувствительность к трихотецину, *мкг/мл*	
	индуцированные культуры	неиндуцированные культуры
Aspergillus niger 1	15,0	300
Penicillium chrysogenum A-14	30,0	400
Fusarium oxysporum f. vasinf ctum	15,0	400
Cladosporium herbarum . .	20,0	300
Verticillium dahliae 40 . .	7,5	100
Helminthosporium turcicum	10,0	50

Литература

Аскарова С. А., Иоффе Р. Я., Гурянова А. И. 1964. Итоги испытания некоторых антибиотиков в борьбе с вилтом хлопчатника. Материалы Всесоюзного симпозиума по борьбе с вилтом хлопчатника. Ташкент.

Манучарян М. А. 1964. Об испытании антибиотика трихотецина для борьбы с мучнистой росой табака. Табак, № 2.

Мокротоваров С. П. 1962. Особенности паразитизма видов фузариум на пшенице. Тр. Воронежск. станции защиты растений, вып. 16.

Станек М. 1962. Антибиотики для защиты растений. Международн. сельскохоз. журн., № 2.

Сухачева Н. В. 1964. Испытание антибиотика трихотецина в борьбе с вилтом хлопчатника. Материалы Всесоюзного симпозиума по борьбе с вилтом хлопчатника. Ташкент.

Убрижи Г., Вереш И. 1962. Антибиотики для защиты растений. Международн. сельскохоз. журн., № 4.

Чайковская С. М. 1963. Особенности инактивации бензилпенициллина пенициллиназой различного происхождения. Антибиотики, № 9.

Abraham E. P., Chain E. B. 1940. Enzyme from bacteria able to destroy penicillin. Nature, vol. 146, p. 837.

Ayliffe G. A. J. 1963. Ampicilline inactivation and sensitivity of Coliform bacilli. Journ. General Microbiol., vol. 30, p. 339.

Ayliffe G. A. J. 1965. Cephalosporinase and penicillinase activity of gram-negative bacteria. Journ. General Microbiol., vol. 40, p. 1.

Claridge C. A., Gourevitch A., Lein J. 1960. Bacterial penicillin-amidase. Nature, vol. 187, № 4733.

Darpoux H., Arnoux M. 1957. Tests of products with curative action against the scabs of pear and apple. Phytiatr. Phytopharm., vol. 6, p. 9—13.

Darpoux H., Faivre-Amiot A. 1953. Action de produits du métabolisme du Trichothecium roseum Link sur divers organismes la plupart phytopathogènes. Atti del VI Congresso Internazionale di Microbiologia, vol. 1, p. 499.

Demain A. L., Walton R. B., Newkirk J. F., Miller J. M. 1963. Microbial degradation of cephalosporin C. Nature, vol. 199, № 4896.
Freeman G. G., Morrison R. J. 1949. The isolation and chemical properties of trichothecin, an antifungal substance from Trichothecium roseum Link. Biochemical Journ., vol. 44, p. 1—5.
Hessayon D. G. 1951. Double-action of trichothecin and its production in soil. Nature, vol. 168, № 4284.
Hessayon D. G. 1953. Fungitoxins in the soil. II. Trichothecin, its production and inactivation in unsterilised soils. Soil Science, vol. 75, № 3.
Horvath J., Varga J. M. 1961. Enzymic inactivation of trichothecin and crotocin. Nature, vol. 192, № 4797.
Horvath J., Varga J. M. 1962. Trichothecinase. Acta microbiol. Acad. Scient. Hungariae, vol. 9, № 2.
Iyer S. N., Dudani A. T., Shrivastava D. L. 1954. Aureomycin inactivation by pathogenic bacteria. Experientia, vol. 10, p. 249.
Katz E., Pienta P. 1957. Decomposition of actinomycin by a soil organism. Science, vol. 126, № 3270.
Klein D., Pramer D. 1961. Bacterial dissimilation of streptomycin. Journ. Bacteriol., vol. 82, p. 505.
Meyers E., Smith D. A. 1962. Microbiological degradation of tetracyclines. Journ. Bacteriol., vol. 84, p. 797.
Oku H., Nakanishi T. 1964. Reductive detoxification of an antibiotic, ascochytine, by an insensitive fungus, Fusarium lycopersici Sacc. Naturwissenschaften, Bd. 51. S. 22.
Park D. 1955. Experimental studies on the ecology of fungi in soil. Trans. British Mycological Soc., vol. 38, № 2.
Percival A., Brumfitt W., de Louvois J. 1963. The role of penicillinase in determining natural and acquired resistance of gramnegative bacteria to penicillins. Journ. General Microbiol., vol. 32, p. 1.
Sabath L., Finland M. 1963. Inactivation of some semisynthetic penicillins by gramnegative bacilli. Journ. Bacteriol., vol. 85, № 2.
Schumacher G. E. 1963. Chemotherapeutic aspects of penicillin-penicillinase interaction. Amer. Journ. Pharm., vol. 135, № 7.
Smith I. T., Hamilton-Miller J. M. 1963. Differences between penicillinases from gram-positive and gram-negative bacteria. Nature, vol. 197, № 4871.
Stanecki J., Fast J., Krzywy T. 1958. Inactivation of the bacteriostatic action of chlortetracycline by substances, produced by bacterial metabolism. Antibiotics and Chemother., vol. 8, p. 167.
Vörös J. 1955. A trichothecin antibioticum alkalmazása növényi kórokozók ellen. Növénytermelés, vol. 4, № 3.

Рекомендована кафедрой низших растений Московского государственного университета им. М. В. Ломоносова

Поступила
11 июля 1966 г.

TSYPLAKOVA, O.D. 1967

O vzaimosvyazi fitontsidnykh svoĭstv Topoleĭ i ikh ustoichi-vosti k tsitosporozu. [On the correlation between the phytoncidal properties of Poplars and their resistance to Cytospora disease.]

Biol. Nauki, 10 (5): 139-141. [2 tables. Inst. For. Technol., Voronezh.]

Microfilm no. 14196

Карасевич Ю. Н., [illegible] некоторых микроорганизмов треонином. Докл. АН СССР, т. 163, № 5.

Найденова Л. П. 1965. Потребность термофильных бактерий в аминокислотах. Микробиология, т. 34, вып. 3.

Полонская М. С. 1963. Культура азотобактера, выделенная из организма животных. Сборник статей по сельскохозяйственной микробиологии, вып. 18. Л.

Полонская М. С., Леонович В. В. 1963. Об азотобактере в организме животного. Докл. ВАСХНИЛ, вып. 1.

Полонская М. С., Поперекова Т. М. 1962. Культура типа Azotobacter в животном организме. Агробиология, № 1.

Рубан Е. Л. 1962. Аминокислотный обмен у бактерий. Изв. АН СССР, сер. биол., № 3.

Рубан Е. Л. 1965. Неспецифические функции аминокислот. Усп. микробиологии, вып. 2.

Рубенчик Л. И. 1960. Азотобактер и его использование в сельском хозяйстве. Киев.

Сохина А. М., Биргер М. О. 1965. О потреблении аминокислот различными патогенными микробами. Журн микробиологии, эпидемиологии и иммунологии, № 3.

Baret R., Mourgue M. 1964. Etude de l'action de divers ocidesamines sur la desamidination de l'acide guanidobutyrique et la l'arginine par le foie de raie. Compt. rend. Soc. biol., t. 158, № 10.

Bayne H. G., Stokes J. Z., 1961. Metabolism of amino acids in Salmonella. Journ. Bacteriol., vol. 81, № 1.

Dawes E. A. 1964. Nutritional and environmental factors affecting the endogenous metabolism of bacteria. Proc. Nutr. soc., vol. 23, № 2.

Erlandson J. K., Ruhl R. F. 1956. Oxidatives dissamilation of amino acids and related compounds by Shigela F. Journ. Bacteriol., vol. 72, № 5.

Próhaszka L., Muranyi F. 1956. Behaviour of Salmonela strains in synthetik media. Acta microbiol. Acad. Sci. Hung., vol. 3, № 3.

Próhaszka L., Muranyi F. 1958. The role of serine in the metabolism of E. coli strains. Acta microbiol. Acad. Sci. Hung., vol. 5, № 3.

Stadtman E. R. 1963. Bacteriol. Rev., vol. 27, № 2.

Рекомендована кафедрой органической и биологической химии Московского государственного педагогического института им. В. И. Ленина

Поступила
16 февраля 1966 г.

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● № 5 ● 1967

МИКРОБИОЛОГИЯ И ВИРУСОЛОГИЯ

О ВЗАИМОСВЯЗИ ФИТОНЦИДНЫХ СВОЙСТВ ТОПОЛЕЙ И ИХ УСТОЙЧИВОСТИ К ЦИТОСПОРОЗУ

О. Д. Цыплакова

Многими исследователями (Б. П. Токин, 1951; К. Т. Сухоруков, 1952; П. А. Положенцев и И. П. Положенцев, 1952; Д. Д. Вердеревский, 1959) установлено, что фитонциды — одно из средств борьбы за существование растительных организмов, один из факторов естественного иммунитета растений. Имеющиеся в литературе данные говорят об избирательном действии фитонцидов в отношении отдельных микроорганизмов. Однако мы не обнаружили сведений о влиянии фитонцидных свойств тополей на их восприимчивость к цитоспорозу коры.

В настоящем сообщении приводятся результаты изучения роли фитонцидных свойств различных гибридных форм тополей в их иммунитете к возбудителю болезни коры — Cytospora chrysosperma Fr.

Работу проводили на Воронежской станции защиты растений в апреле — мае 1966 г. [время интенсивного развития болезни, по данным Э. А. Холькиной (1958) и И. А. Ибрагимова (1961)]. Для исследования были взяты устойчивый к цитоспорозу тополь пирамидальный×осокорь камышинский (поражаемость цитоспорозом 5% от общего числа стволов), восприимчивый тополь московский×краснонервный № 1131 (поражаемость цитоспорозом 20%) и неустойчивый тополь московский улучшенный×краснонервный № 1420 (поражаемость цитоспорозом 58—100%). Источниками фитонцидов служили мезга из коры с почками и водная вытяжка из ветвей.

Действие летучих фитонцидов и вытяжки испытывали на поведении колоний чистой культуры Cytospora chrysosperma Fr. разного возраста. Культуры были получены пересевом мицелия на агаризованное пивное сусло. Опыт ставили при температуре +24° С. Наблюдения за ростом мицелия в колониях проводили ежедневно в течение 10 и 5 дней, начиная со дня закладки мезги или вытяжки. В таблицах приводятся данные за первые 3 дня непосредственного действия летучих фитонцидов и вытяжки на рост гриба.

Мезгу готовили по несколько измененной методике Д. Д. Вердеревского (1957) и помещали в чашки с инокулюмом (мицелий, пересеянный одновременно с внесением мезги в чашку) и 3-дневными культурами гриба. Смену мезги производили в течение 3 дней: в 1-й день — 3 раза через каждые 3 *ч*, на 2-й день — 2 раза через 18 и 6 *ч*, на 3-й день — 1 раз через 18 *ч*. Для получения водной вытяжки в 50 *мл* дистиллированной воды помещали 20 *г* ветвей с корой и настаивали в течение 12 *ч*. Действие вытяжки проверяли на росте 6- и 10-дневных культур гриба. Вытяжку наливали в специально вырезанную в питательной среде (в 2 *см* от колонии гриба) выемку радиусом 2 *см* и глубиной до 0,5 *см*. Об активности фитонцидов вытяжки судили по скорости роста колоний вблизи вытяжки. Смену вытяжки производили через 3, 6 и 12 *ч* в течение 3 дней.

Как видно из таблицы 1, летучие фитонциды устойчивого к болезни тополя угнетают 3-дневную культуру гриба, снижая скорость ее роста

Таблица 1

Влияние летучих фитонцидов на рост 3-дневных колоний Cytospora chrysosperma Fr.

Источник фитонцидов	Ежедневная скорость роста колоний, *мм*			Средняя (в сутки) скорость роста, *мм*
	18.IV	19.IV	20.IV	
Тополь пирамидальный × осокорь камышинский	4,0	5,0	5,0	4,7
Тополь московский × краснонервный № 1131	6,0	6,0	6,0	6,0
Тополь московский улучшенный × краснонервный № 1420	8,5	8,5	7,0	8,0
Контроль (вата, смоченная в дистиллированной воде)	8,0	8,0	7,5	7,8

в 1,6 раза. Летучие фитонциды восприимчивого тополя снижают скорость роста 3-дневной культуры гриба лишь на 1,8 *мм*. Фитонциды неустойчивого тополя почти не оказывают действия на рост 3-дневной культуры.

При наблюдении за действием летучих фитонцидов на инокулюм отмечено следующее. Рост гриба в опыте с мезгой восприимчивого тополя начался одновременно с контролем (на 4-й день после посева). Летучие фитонциды устойчивого тополя на 1 день задержали, а фитонциды неустойчивого тополя на 1 день ускорили начало роста гриба по сравнению с контролем.

Таблица 2

Влияние вытяжки из тополевых ветвей на рост колоний Cytospora chrysosperma Fr.

Источник фитонцидов	Возраст колонии грибов, дни	Ежедневная скорость роста колоний, *мм*			Средняя (в сутки) скорость роста, *мм*
		12.V	13.V	14.V	
Тополь пирамидальный × осокорь камышинский	6	3,5	2,0	0	1,8
	10	4,0	5,5	0	3,2
Тополь московский × краснонервный № 1131	6	7,5	5,5	4,5	5,8
	10	1,5	1,5	0	1,0
Тополь московский улучшенный × × краснонервный № 1420	6	5,5	5,5	4,5	5,2
	10	5,0	2,5	0	2,5
Контроль (дистиллированная вода)	6	6,0	5,0	5,0	5,3
	10	5,5	5,0	5,0	5,2

Данные, представленные в таблице 2, свидетельствуют о том, что вытяжка из ветвей устойчивого тополя в первые 2 дня угнетает рост 6-дневной и в 1-й день — 10-дневной культур гриба, а на 3-й день совсем прекращает их рост. В среднем скорость роста культур под влиянием вытяжки устойчивого тополя снизилась соответственно в 3 и 1,6 раза по сравнению с контролем. Вытяжки из ветвей восприимчивого и неустойчивого тополей почти не оказывают действия на 6-дневную культуру гриба, но угнетают рост 10-дневной культуры. При этом наиболее интенсивное действие оказывает вытяжка из ветвей восприимчивого тополя, снижающая скорость роста 10-дневной культуры в 5 раз по сравнению с контролем. По-видимому, вирулентность 10-дневной культуры гриба ослабляется в связи с ее длительным ростом на искусственной питательной среде, поэтому на нее влияют вытяжки из всех трех видов тополей.

Результаты наших исследований позволяют говорить о некоторой коррелятивной зависимости между фитонцидными свойствами тополей и их устойчивостью к цитоспорозу коры.

Литература

Вердеревский Д. Д. 1957. О методике изучения фитонцидных (антимикробиальных) свойств растений в фитопатологии. Кишинев.

Вердеревский Д. Д. 1959. Иммунитет растений к паразитарным болезням. Сельхозгиз, М.—Л.

Ибрагимов И. А. 1961. Цитоспороз тополей и меры борьбы с ним. Сборник трудов по лесному хозяйству Всес. н.-и. ин-та лесоводства и механизации лесного хоз-ва. Башкирск. лесная опытная станция, вып. 5. Уфа.

Положенцев П. А. и Положенцев И. П. 1952. Инфузорный метод для диагностирования состояния дуба: В сб.: Фитонциды, их роль и значение для медицины. М.

Сухоруков К. Т. 1952. Физиология иммунитета растений. Изд-во АН СССР, М.

Токин Б. П. 1951. Губители микробов—фитонциды. Госкультпросветиздат, М.

Холькина Э. А. 1958. О цитоспорозных заболеваниях древесных пород на примере яблони и тополей. Докл. ТСХА, вып. 36.

Рекомендована кафедрой лесозащиты Воронежского лесотехнического института

Поступила 1 сентября 1966 г.

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● №4 ● 1967

МИКРОБИОЛОГИЯ И ВИРУСОЛОГИЯ

ЗАБОЛЕВАНИЕ КАРТОФЕЛЯ ЧЕРНОЙ НОЖКОЙ В ОАР

М. А. Абдель-Рэхим

Черная ножка картофеля не относится к числу серьезных заболеваний этой культуры в ОАР. До 1963 г. случаи поражения картофеля черной ножкой встречались очень редко. Сабет (K. Sabet, 1954) исследовал пораженные растения картофеля и в качестве эндемичного возбудителя болезни идентифицировал Bacterium carotovorum var. atrosepticum (Van Hall.) Helmers and Dowson. В 1963—1964 гг. в провинции Эль-Бихере при выращивании картофеля сорта Альфа, импортированного из Ирландии, было отмечено очень сильное поражение растений черной ножкой. Культура бактерии, выделенная из семенных клубней, из стеблей и клубней больных растений, а также из клубней нового урожая, была идентифицирована как Pectobacterium carotovorum (Jones) Waldee var. atrosepticum Dowson.

Мы исследовали морфологические и биохимические свойства бактериального изолята, полученного из больных растений и клубней картофеля сорта Альфа, и устойчивость к возбудителю других сортов картофеля.

В работе использовали зараженный семенной картофель сорта Альфа, импортированный в ОАР из Ирландии в 1963 г., а также вегетирующие растения того же сорта с симптомами поражения черной ножкой и их клубни с того же поля. Устойчивость к возбудителю болезни изучали на сортах картофеля: Альфа, Аран-Банар, Клауди, Карбонди, Кинг Эдвард, Мажестик и Патронес.

Изоляты и реизоляты возбудителя культивировали на питательном и картофельно-декстрозном агаре. Патогенные изоляты бактерий идентифицировали по их морфологическим и физиологическим свойствам. Для окраски спор и капсул бактерий использовали модификации методов Гукера, Шеффера-Фултона и Антони. Ферментативные пробы проводили на неорганической основной среде (W. Dowson, 1957) и на основном отваре Дифко (Manual of Dehydrated Cultura Media and Reagents for Microbiological and clinical Laboratory Procedures, 1953). Разжижение питательной желатины, восстановление нитратов, гидролиз крахмала, лакмусовый тест молока, обнаружение сероводорода с помощью уксусно-свинцовой бумаги, пробы метиловым красным, индолом, а также пробу Вогес-Проскауера выполняли по методам, рекомендованным комитетом американских биологов (Manual of Microbiological Methods, 1957). Результаты реакций расшифровывали по Грейхему и Доусону (B. Graham, W. Dowson, 1960a). Этиловый спирт, добавлявшийся к основной среде, приготовляли по методу Айерса (S. Ayers et oth., 1919), пептон — по методу Масси (A. Massey, 1924). Температура инкубации во всех опытах была 24—27° С.

В изолятах обнаружены короткие палочки подвижные, не образующие спор и капсул, грамотрицательные. На питательном агаре вырастают мелкие выпуклые колонии сероватого или белого цвета, не изменяющие среду. На агаре Мак-Конки возникают колонии с неправильными краями, выпуклые, в недельном возрасте сероватые. На питательном агаре при посеве штрихом культура растет умеренно, ко-

1967

ABDEL'-RÉKHIM, M.A.

Zabolevanie Kartofelya chernoi nozhkoĭ v OAR.
[Black leg of Potatoes in the U.A.R.]

Biol. Nauki, 10 (4): 114-116. [1 table.]

Microfilm no. 14197

Таблица 1

Соединения углерода	Разложение соединений углерода на кислоту и газ			
	основная среда		пурпуровый отвар Дифко	
	кислота	газ	кислота	газ
Контроль (среда без углерода)	Роста нет		Роста нет	
Арабиноза	+	±	+	+
Ксилоза		—	+	+
Глюкоза	+	±	+	+
Фруктоза		±	+	+
Галактоза	+	—	+	+
Маннноза	+	±	+	+
Лактоза	+	±	+	+
Сахароза		±	+	+
Мальтоза		±	+	+
Раффиноза	+	—	—	—
Крахмал	+	±	+	+
Глицерин		—	+	—
Маннит	+	+	+	+
Сорбит	+	—	+	+
Этиловый спирт	—	—	+°	—
Салицин	+	—	+	—

Примечание. (+) — небольшое количество кислоты или газа, (±) — следы кислоты или газа, (—) — отсутствие кислоты или газа, (+°) — среда содержала 5% этилового спирта в пептоновом отваре, организм подкислял среду в течение первых 4 дней, после чего начиналось подщелачивание среды.

При температуре 25—27° С изучаемый штамм в течение трех дней вызывает мокрую гниль кормовых бобов, но не поражает томаты, каллу и кукурузу. Штамм обладает инфекционностью по отношению ко всем испытанным сортам картофеля, при температуре 19—28° С вызывает типичное поражение этой культуры.

Бактерии, выделенные из больных семенных клубней картофеля сорта Альфа, из стеблей вегетирующих растений и из их клубней, были идентичны по морфологическим, культуральным, физиологическим и патогенным признакам.

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● №4 ● 1967

МИКРОБИОЛОГИЯ И ВИРУСОЛОГИЯ

ЗАБОЛЕВАНИЕ КАРТОФЕЛЯ ЧЕРНОЙ НОЖКОЙ В ОАР

М. А. Абдель-Рэхим

Черная ножка картофеля не относится к числу серьезных заболеваний этой культуры в ОАР. До 1963 г. случаи поражения картофеля черной ножкой встречались очень редко. Сабет (K. Sabet, 1954) исследовал пораженные растения картофеля и в качестве эндемичного возбудителя болезни идентифицировал Bacterium carotovorum var. atrosepticum (Van Hall.) Helmers and Dowson. В 1963—1964 гг. в провинции Эль-Бихере при выращивании картофеля сорта Альфа, импортированного из Ирландии, было отмечено очень сильное поражение растений черной ножкой. Культура бактерии, выделенная из семенных клубней, из стеблей и клубней больных растений, а также из клубней нового урожая, была идентифицирована как Pectobacterium carotovorum (Jones) Waldee var. atrosepticum Dowson.

Мы исследовали морфологические и биохимические свойства бактериального изолята, полученного из больных растений и клубней картофеля сорта Альфа, и устойчивость к возбудителю других сортов картофеля.

В работе использовали зараженный семенной картофель сорта Альфа, импортированный в ОАР из Ирландии в 1963 г., а также вегетирующие растения того же сорта с симптомами поражения черной ножкой и их клубни с того же поля. Устойчивость к возбудителю болезни изучали на сортах картофеля: Альфа, Аран-Банар, Клауди, Карбонди, Кинг Эдвард, Мажестик и Патронес.

Изоляты и реизоляты возбудителя культивировали на питательном и картофельно-декстрозном агаре. Патогенные изоляты бактерий идентифицировали по их морфологическим и физиологическим свойствам. Для окраски спор и капсул бактерий использовали модификации методов Гукера, Шеффера-Фултона и Антони. Ферментативные пробы проводили на неорганической основной среде (W. Dowson, 1957) и на основном отваре Дифко (Manual of Dehydrated Cultura Media and Reagents for Microbiological and clinical Laboratory Procedures, 1953). Разжижение питательной желатины, восстановление нитратов, гидролиз крахмала, лакмусовый тест молока, обнаружение сероводорода с помощью уксусно-свинцовой бумаги, пробы метиловым красным, индолом, а также пробу Вогес-Проскауера выполняли по методам, рекомендованным комитетом американских биологов (Manual of Microbiological Methods, 1957). Результаты реакций расшифровывали по Грейхему и Доусону (B. Graham, W. Dowson, 1960a). Этиловый спирт, добавлявшийся к основной среде, приготовляли по методу Айерса (S. Ayers et oth., 1919), пептон — по методу Масси (A. Massey, 1924). Температура инкубации во всех опытах была 24—27° С.

В изолятах обнаружены короткие палочки подвижные, не образующие спор и капсул, грамотрицательные. На питательном агаре вырастают мелкие выпуклые колонии сероватого или белого цвета, не изменяющие среду. На агаре Мак-Конки возникают колонии с неправильными краями, выпуклые, в недельном возрасте сероватые. На питательном агаре при посеве штрихом культура растет умеренно, ко-

лонии нитевидные. Питательный отвар умеренно мутный, с небольшим кольцом, позднее появляется беловатый осадок. Отвар Мак-Конки мутнеет и подкисляется без образования газа. На картофельных блоках возбудители растут хорошо.

В результате жизнедеятельности бактерий питательная желатина разжижается, чистая желатина разжижается слабо по истечении месяца. Лакмусовая проба молока обнаруживает подкисление, затем молоко обесцвечивается и створоживается; в течение пяти дней выделяется небольшое количество сыворотки; пептонизации не происходит. Нитраты восстанавливались до нитритов, индол и сероводород не образовывали. Реакция Вогес-Проскауера дала отрицательные, а реакции на метиловый красный и на гидролиз крахмала — положительные результаты.

Бактерии ассимилировали пептон, дрожжевой экстракт и аспарагин при добавлении 3—5% хлористого натрия; при добавлении 7% этой соли колонии не росли. Отношение бактерий к соединениям углерода характеризуют данные таблицы 1. Оптимальная температура развития 27° С, минимальная — ниже 7° С, максимальная — 31—32° С.

Таблица 1

Соединения углерода	Разложение соединений углерода на кислоту и газ			
	основная среда		пурпуровый отвар Дифко	
	кислота	газ	кислота	газ
Контроль (среда без углерода)	Роста нет		Роста нет	
Арабиноза	+	±	+	+
Ксилоза	—	—	+	+
Глюкоза	+	±	+	+
Фруктоза	—	±	+	+
Галактоза	+	—	+	+
Маннноза	+	±	+	+
Лактоза	+	±	+	+
Сахароза	—	±	+	+
Мальтоза	—	±	+	+
Раффиноза	+	—	—	—
Крахмал	+	±	+	+
Глицерин	—	—	+	—
Маннит	+	+	+	+
Сорбит	+	—	+	+
Этиловый спирт	—	—	+°	—
Салицин	+	—	+	—

Примечание. (+) — небольшое количество кислоты или газа, (±)—следы кислоты или газа, (—)—отсутствие кислоты или газа, (+°)—среда содержала 5% этилового спирта в пептоновом отваре, организм подкислял среду в течение первых 4 дней, после чего начиналось подщелачивание среды.

При температуре 25—27° С изучаемый штамм в течение трех дней вызывает мокрую гниль кормовых бобов, но не поражает томаты, каллу и кукурузу. Штамм обладает инфекционностью по отношению ко всем испытанным сортам картофеля, при температуре 19—28° С вызывает типичное поражение этой культуры.

Бактерии, выделенные из больных семенных клубней картофеля сорта Альфа, из стеблей вегетирующих растений и из их клубней, были идентичны по морфологическим, культуральным, физиологическим и патогенным признакам.

Свойства исследованного нами изолята соответствуют характеристике штамма Erwinia atroseptica (Van Hall) Jennisson, данной Буркхолдером (W. Burkholder a. oth., 1949). Отличия заключаются лишь в отношении микроорганизмов к максимальной температуре и способности к гидролизу крахмала. Свойства изолята во многом сходны со свойствами E. atroseptica, которые описал Малькольмсон (J. Malcolmson, 1959). Оба микроорганизма имеют одинаковые оптимальную и максимальную температуры развития, способны ассимилировать мальтозу, добавленную к синтетической среде, одинаково ведут себя на основной среде, не содержащей углерода, а также в пептоновом отваре и основной среде, содержащих 5% этилового спирта. Биохимические свойства выделенного нами изолята очень близки к биохимической характеристике Pectobacterium carotovorum var. atrosepticum (B. Graham, W. Dowson, 1960). Оба микроорганизма могут заражать растения при низкой (19° С) и более высокой (28° С) температуре.

Полученный нами штамм можно идентифицировать как Pectobacterium carotovorum (Jones) Waldee var. atrosepticum Dowson. Грэхем (D. Graham, 1962) установил, что Pect. carotovorum var. atrosepticum не является обычным обитателем почвы, но нередко выживает в ассоциации с корнями других культур, у которых он не вызывает симптомов болезни.

Мы установили, что заболевание типа черной ножки встречается у картофеля всех испытанных нами сортов. Однако чаще всего это заболевание поражает картофель сорта Альфа. Растения других сортов, растущие рядом с больным картофелем сорта Альфа, часто остаются здоровыми. Это позволяет заключить, что возбудитель черной ножки интродуцирован с семенным картофелем сорта Альфа из Ирландии и не является эндемичным для ОАР видом.

В заключение мы пользуемся случаем, чтобы выразить благодарность доктору К. Сабет за помощь в идентификации бактерий и докторам С. Сакр и С. Хамди за содействие в получении сортов картофеля.

Литература

Ayers S. H., Rupp D. and Joltnson W. T. 1919. A study of the alkali-forming bacteria in milk. Bull. U. S. Depart. Agric. № 782 (After Malcolmson, 1959).

Burkholder W. H., Wilson L., Smith Jr. 1949. Erwinia atroseptica (Van Hall) Jennison and Erwinia carotovora (Jones) Holland. Phytopathol., 39 (11).

Dowson W. J. 1957. Plant Diseases due to Bacteria. Cambridge Univ. Press.

Graham D. C. 1962. Black leg disease of potatoes. Scot. Agric. 1962, Spring, 14 pp. (R. A. M. 42:46).

Graham B. C., Dowson W. J. 1960. The coliform bacteria associated with potato black-leg and other soft rots. 1. Their pathogenicity in relation to temperature. Ann. appl. Biol., vol. 48, № 51.

Graham B. C., Dowson W. J. 1960a. The coliform bacteria associated with potato black-leg, and other soft rots. II. Biochemical characteristics of low- and high-temperature strains. Ann. appl. Biol., vol. 48, № 58.

Malcolmson J. F. 1959. A study of Erwinia isolates obtained from soft rots and black leg of potatoes. Trans. Brit. Mycol. Soc., vol. 42.

Manual of Dehydrated Culture Media and Reagents for Microbiological and Clinical Laboratory Procedures. 1953. 9 th ed. Difco Laboratories Inc. Detroit 1, Michigan.

Manual of Microbiological Methods. 1957. Society of American Bacteriologists. New York.

Massey A. B. 1924. A study of Bacillus aroideae (Townsend) the cause of soft rot of tomato and B. carotovorus Jones. Phytopathol., vol. 14.

Sabet K. A. 1954. Non-sporing bacteria responsible for softrots and related diseases in vegetables. Proc. Egypt. Acad. of Sci., vol. X.

Рекомендована кафедрой низших растений Московского государственного университета им. М. В. Ломоносова

Поступила
8 января 1966 г.

НАУЧНЫЕ ДОКЛАДЫ ВЫСШЕЙ ШКОЛЫ
БИОЛОГИЧЕСКИЕ НАУКИ ● №4 ● 1967

ПОЧВОВЕДЕНИЕ

О ВЛИЯНИИ СВЯЗНОСТИ ПОЧВЕННЫХ ЗЕРЕН ДРУГ С ДРУГОМ НА ПРОТИВОЭРОЗИОННУЮ СТОЙКОСТЬ СВЕТЛО-КАШТАНОВЫХ ПОЧВ ЕРГЕНЕЙ

М. С. Кузнецов

Эрозия почвы, как известно, зависит от ряда взаимосвязанных факторов: климатических условий, рельефа, растительного покрова, свойств почвы и деятельности человека. Свойства почвы в этом отношении изучены далеко не достаточно. Миддльтон (H. Middleton, 1930) попытался получить показатель смываемости почв путем измерения некоторых ее физических свойств. Легкость разрушения агрегатов под действием дождя или потока воды он предложил характеризовать дисперсионным отношением, а относительную водопроницаемость почвы — отношением содержания коллоидной фракции к эквиваленту влажности. Поскольку эрозия почвы, по-видимому, связана прямой зависимостью с легкостью диспергирования материала и обратной — с ее водопроницаемостью, Миддльтон получил эрозионное отношение путем деления дисперсионного отношения на отношение содержания коллоидной фракции к эквиваленту влажности.

Дальнейшие исследования показали, что между дисперсионным отношением и подверженностью эрозии большинства почв существует некоторая зависимость. Тесной корреляции между этими двумя факторами и нельзя ожидать, поскольку дисперсионное отношение не учитывает такого важного свойства почвы, как связность отдельных почвенных зерен друг с другом. Насколько важен этот фактор, можно судить на примере красноземов Грузии. Эти почвы обладают хорошо выраженной микро- и макроструктурой и высокой водопроницаемостью. Однако незначительное количество осадков, приходящееся на поверхностный сток, вызывает все же значительный смыв почвы; при этом наиболее быстро сносится агрономически ценная фракция 1—3 *мм* (М. К. Дараселия, 1935). Благодаря высокой водопроницаемости красноземов стока во время дождя может долгое время не быть, но когда он все-таки возникает, структурный, рыхло сложенный пахотный горизонт почвы легко подвергается эрозии. Объясняется это низкой связностью почвенных агрегатов друг с другом, хотя связность частиц внутри агрегатов может быть очень высока.

Подобной точки зрения придерживается также Бэвер (L. Baver, 1956). Он считает, что в начале дождя значительной интенсивности или во время коротких дождей почва эродируется в результате взмучивающего и диспергирующего действия дождевых капель; при этом высокая

KOMEV, YU.E., TSYGANOV, V.A., MINBAEV, R. & MOROZOV, V.M. 1967

Novyĭ rod aktinomitsetov Microechinospora gen. nov.
[A new genus of actinomycetes M. gen. nov.]

Mikrobiologiya, 36 (2): 309-317.
[15 fig., 1 table, Engl. summ.]

Microfilm no. 14198

CCCP, 152.

робиология,

АН СССР.

Р.

. Изд-во АН

ivities in na-
ifornia Press,

es anaerobies,

ANTAGONISTIC PROPER... BACTERIA

V. I. Douda, M. Singer and N. A. Krassilnikov

1. Antagonistic properties of a group of obligately anaerobic sporeforming bacteria isolated from different soils were studied.

2. Most of the cultures tested (9 species) produced substances that inhibited certain grampositive bacteria (azotobacter, actinomycetes) but were inactive toward gramnegative bacteria, fungi and yeast.

3. Antimicrobial effect of some of the anaerobic cultures was significantly stimulated when alluminium or iron salts were added to be medium where antagonists or the test microorganisms were grown.

МИКРОБИОЛОГИЯ

Т. XXXVI 1967 Вып. 2

УДК 576.852.15.078

НОВЫЙ РОД АКТИНОМИЦЕТОВ MICROECHINOSPORA GEN. NOV.

Ю. Е. Конев, В. А. Цыганов, Р. Минбаев и В. М. Морозов

При изучении микрофлоры, выделенной из песков пустыни Кызыл-Кум, была отобрана культура Р-147, сходная с актиномицетами по особенностям роста на агаровых средах и строению тонкого ветвящегося мицелия. Для микроорганизма характерно образование одиночных или значительно реже 2—3 в цепочке крупных (до 3,5 *мк*) спор на концах споронесущих гиф. Споры с прилегающей к ней частью споронесущей гифы заключены в оболочку, образуя спорангии. Спорангиальная оболочка на внешней поверхности имеет своеобразные выросты в виде игл с боковыми мелкими зубчиками.

Сравнение морфологии репродуктивных органов у этого микроорганизма и других представителей лучистых грибков позволило выделить его в новый род Microechinospora gen. nov. В настоящей работе дано описание единственного вида этого рода — Microechinospora grisea sp. nov.

Методика

Строение и развитие культуры наблюдали с помощью микроскопа МБИ-6. Препараты для микроскопии готовили на предметных стеклах методом отпечатков. Для изучения развития микроорганизма и расположения репродуктивных органов культуры периодически микроскопировали непосредственно на поверхности агаровых сред. В электронном микроскопе ЭМ-5 препараты-отпечатки просматривали без предварительного напыления.

Культурально-морфологические признаки описывали при росте микроорганизма на средах, приведенных в руководствах Красильникова (1950) и Ваксмана (Waksman, 1961). Усвоение источников углерода испытывали по методу Придхэма и Готтлиба (Pridham a. Gottlieb, 1948), антагонистические признаки изучали методом наложения блоков из семисуточной агаровой культуры на свежезасеянные газоны тест-микробов.

Результаты

Культура Р-147 была выделена при рассеве суспензии почвы на среде СР-I с глюкозой (Красильников, 1950). Свежевыделенный штамм хорошо рос на обычных, применяемых для культивирования актиномицетов средах, образуя крупные (до 10 *мм*), прочно вросшие в субстрат колонии. На некоторых плотных средах и по всей поверхности или на отдельных участках колоний развивался бархатистый или мучнисто-бархатистый налет, состоящий из вегетативных и споронесущих гиф воздушного мицелия.

Морфологические признаки

Субстратный и воздушный мицелий. Воздушные споры культуры, помещенные на агаровую питательную среду, прорастают в двух-трех местах, образуя ветвящийся истинный мицелий. Субстратный мицелий толщиной 0,3—0,6 *мк* — обычно искривленный, без перегородок.

На плотных средах от субстратного (первичного) мицелия отходят длинные моноподиально ветвящиеся и короткие слабо ветвящиеся гифы воздушного (вторичного) мицелия. На большинстве питательных сред воздушный мицелий рудиментарный или отсутствует. Хорошее образование воздушного мицелия наблюдалось у свежевыделенной культуры на плотных средах с крахмалом, картофельных ломтиках, глицериноаспарагиновом и овсяном агаре. Толщина воздушных гиф обычно не превышает 0,8 *мк*. В молодых культурах фрагментации субстратного и воздушного мицелия не отмечалось.

Спорангии: При выращивании на некоторых плотных питательных средах микроорганизм образует на субстратном и воздушном мицелии спороносодержащие тела, хорошо заметные при малом (в 80—160 раз) увеличении микроскопа (рис. 1, 2). При исследовании их строения с помощью светового и электронного микроскопов обнаружено, что тела состоят из следующих основных элементов: 1) одиночных или немногочисленных (до трех) спор, 2) оболочки, одевающей споры, но не срастающейся с ними, и 3) спороносущей гифы. Подобного рода формы репродуктивных органов называют в микологии спорангиями (Курсанов, 1940).

Аналогично спорангиям мукоровых грибов спорангии актиномицета Р-147 образуются вне субстрата, в воздухе, на концах спороносущих гиф, отходящих от субстратного или воздушного мицелия. Форма спорангиев этого микроорганизма обычно шаровидная или грушевидная (рис. 3—6). Размеры спорангиев (без учета выростов) 2,0—3,5×3—6 *мк*. Расположение их на субстратном и воздушном мицелии одиночное и гроздевидное (рис. 1—5). Преобладающее формирование спорангиев наблюдается на субстратном мицелии, ближе к центру колоний, на картофельной и овсяной средах.

Споры и спороносущие гифы. В стадии завершенного спорообразования спорангии, как правило, содержат по одной споре (спорангиеспоре) размером 1,8—3,5 *мк* (обычно 2 *мк*). В редких случаях в спорангиях, расположенных на воздушном мицелии, можно видеть 2—3 споры, образующиеся базипетально в один ряд (рис. 3, 7). В спорангиях, расположенных на субстратном мицелии, обнаружены только одиночные споры, часто более крупного размера (до 3,5 *мк*).

Форма спор шаровидная или овальная, поверхность споровой оболочки гладкая.

Споры формируются внутри спорангия на концах спороносущих гиф-спорангиеносцев. Дистальная часть этих гиф обычно имеет булавовидное строение. Она, так же как и споры, более интенсивно красится метиленовым синим и при механическом разрушении, например, в процессе приготовления препаратов-отпечатков отваливается от спороносущей гифы вместе со спорой (рис. 8). Спорангиеносцы имеют широко варьирующие размеры. Их длина от субстратного мицелия или осевой воздушной гифы до спорангия колеблется от 1 до 8 *мм*. Толщина спорангиеносца 0,6—0,8 *мк*.

Спорангиальные оболочки. Характерной особенностью микроорганизма является образование игольчато-шиповатого чехла, плотно облегающего спору (споры) и ближайшую к ней часть спороносущей гифы (рис. 8—10). Как показали наблюдения спорангиев под электронным микроскопом, чехол или спорангиальная оболочка при механическом разрушении может быть отделена от споры, что указывает на слабую связь между ними (рис. 11—13). Выросты на внешней поверхности спорангиальной оболочки имеют форму игл и шипов, размер которых достигает 1,5—2 *мк*. На краях выростов при увеличении в 40 000 раз

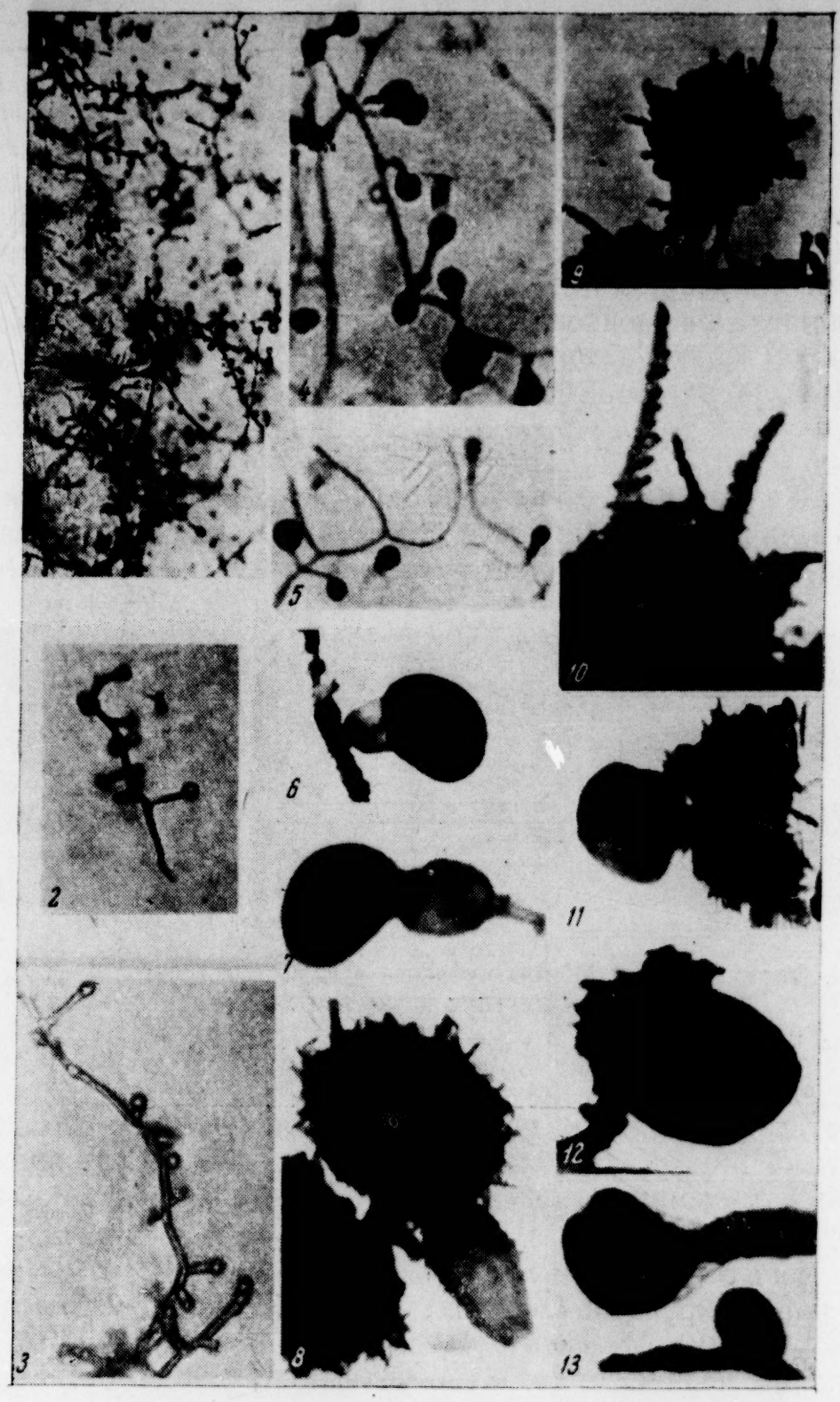

Рис. 1. Край колонии Microechinospora grisea. Расположение спорангиев на воздушных гифах. Месячная культура на картофельном агаре. Ув. 180×

Рис. 2. То же. Ув. 380×

Рис. 3. Спорангии на воздушных гифах, содержащие по одной, редко по две споры. Месячная культура на глицерино-аспарагиновом агаре. Ув. 380×

Рис. 4, 5. Форма спорангиев Microechinospora grisea. Препарат на стекле обрастания, окрашенный метиленовым синим. Месячная культура на среде Чапека с крахмалом. Ув. 1750×

Рис. 6. Грушевидный односпоровый спорангий. Препарат с двухмесячной культуры на агаровой среде Чапека с крахмалом. Электронный микроскоп. Ув. 6000×

Рис. 7. Образование второй споры из булавовидного вздутия спорангия. Месячная культура на картофельном агаре. Ув. 6000×

Рис. 8. Спорангии с булавовидным вздутием, отвалившиеся от мицелия при приготовлении препарата отпечатка. Ув. 7000×

Рис. 9. Игольчатые и шиповидные выросты на спорангиальной оболочке Microechinospora grisea. Препарат-отпечаток с месячной культуры на картофельном агаре. Ув. 6000×

Рис. 10. То же. Ув. 25000×. На игольчатых выростах заметны вторичные зубчики или бугорки

Рис. 11, 12. Спорангиоспоры, освобождающиеся при разрушении спорангиальной оболочки. Ув. 6000×

Рис. 13. Отслаивание спорангиальной оболочки от споры и прилежащей к ней части спороносущей гифы. Ув. 6000×

можно наблюдать еще более мелкие (0,05—0,1 *мк*) зубчики или бородавки (рис. 10).

Следует отметить, что выросты на спорангиальной оболочке появляются при развитии культуры в определенных условиях. В частности, спорангии с игольчато-зубчатыми выростами на оболочке наблюдались нами, когда микроорганизм выращивали при 37° в течение 25—30 суток в верхней части скошенного в пробирках картофельного или овсяного агара.

Культуральные признаки

Агар Чапека с глюкозой. Рост хороший. Колонии крупные (до 8 *мм* в диаметре), выпуклые, бугристые, с глянцевой поверхностью (рис. 14, *а*). Споры и короткие и воздушные гифы образуются ограни-

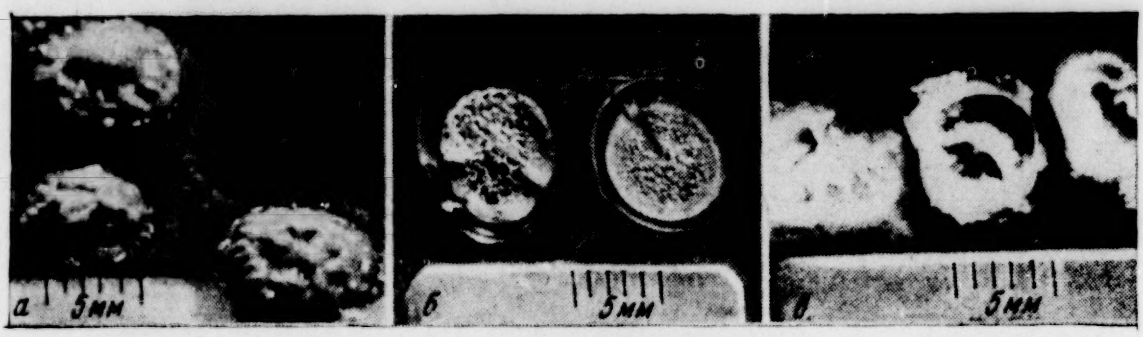

Рис. 14. Форма колоний Microechinospora grisea. Культуры выращены на агаровых средах в течение 24 дней

а — среда Чапека с глюкозой, *б* — среда Чапека с крахмалом, *в* — глицерино-аспарагиновая среда

ченно на отдельных участках колоний и имеют окраску от белого до сизо-сероватого; приблизительно н2 по шкале цвета Бондарцева (1954). Субстратный мицелий розовый или светло-фиолетово-розовый (ж3 до н4). Среду не окрашивает.

Агар Чапека с крахмалом. Рост хороший. Колонии круглые с ровным краем, крупные (до 1 *см*), с мучнистой или мелкогубчатой поверхностью (рис. 14, *б*), имеющей беловатый или темно-серый цвет (а2). Часть колоний неопушенная. Субстратный мицелий розоватый, светло-фиолетово-серый (д2 до о1). Среду не окрашивает.

Крахмало-аммиачный агар. Плоские глянцевые колонии. Воздушные гифы и споры отсутствуют или образуются в виде ободка по краю колоний, сероватые (а4). Субстратный мицелий бесцветный или розоватый (о5).

Среда СР-1 с глюкозой. Окраска и форма колоний такие же, как на среде Чапека с глюкозой, но рост менее интенсивный.

Глицерино-аспарагиновый агар с микроколичествами солей. Хороший рост. Колонии двух типов: бугристые, неопушенные, со стелющимся краем; кратерообразные, приподнятые, с мучнистой поверхностью (рис. 14, *в*). Воздушный мицелий у последних короткий, беловатый, палевый, иногда с розоватым оттенком (а3). Спорангии образуются обильно. Субстратный мицелий желтоватый или бесцветный.

Глюкозо-аспарагиновый агар. Рост — аналогичный предыдущему.

Овсяный агар с микроколичествами солей. Рост обильный. Колонии приподнятые, опушены серым или голубовато-серым

воздушным мицелием. Спороношение выражено хорошо. Субстратный мицелий бесцветный, желтоватый или палево-серый (в3). Среда не окрашена.

Тирозиновый агар. Колонии бугристые, розовато-буроватые (о2), слабо врастают в агар. Воздушный мицелий отсутствует или слаборазвитый, белесый (д1). Среда не буреет.

Мясо-пептонный агар. Рост умеренный. Колонии бесцветные, выпуклые, неопушенные. Растворимые пигменты не образуются.

Сусло-агар. Белесые до буроватых (цвета среды), неопушенные, сморчковидные колонии.

Картофельный ломтик. Рост хороший. Колонии бугристые, розоватые, покрыты сизо-серым воздушным мицелием. Ломтик не буреет.

Физиологические признаки

Штамм Р-147 на железисто-пептонной среде не образует сероводорода. Не растет на клетчатке. Молоко пептонизирует слабо. Желатину разжижает. Нитраты не восстанавливает. Сахарозу инвертирует.

На среде Придхэма — Готтлиба хорошо растет в присутствии одного из следующих источников углерода: ксилозы, глюкозы, фруктозы, арабинозы, галактозы, рамнозы, инулина. Умеренно растет на среде с мальтозой, лактозой, сахарозой, рафинозой, крахмалом, маннитом, лимоннокислым и яблочнокислым натрием. Нет роста или сомнительный рост в присутствии сорбита и целлюлозы.

Штамм хорошо развивался при 20, 26 и 37°. При 37° рост более интенсивный. При 50° роста не отмечалось. Аэроб.

Культура выделена из образца желто-серой супесчаной почвы, взятого в марте 1962 г., на глубине 30—40 *см* в юго-западной части пустыни Кызыл-Кум

Антибиотические свойства

При выращивании на плотных и жидких средах штамм Р-147 не подавлял роста исследованных штаммов грамположительных, грамотрицательных и кислотоустойчивых бактерий (Staphylococcus aureus 209P, Escherichia coli Mycobacterium B-5), а также дрожжей и дрожжеподобных грибов (Saccharomyces cerevisiae, Candida albicans). Аграровые культуры и экстракты из мицелия, выращенного на жидкой среде с кукурузным экстрактом в условиях встряхивания (220 *об/мин*), при 26°, обладали антибиотической активностью по отношению к некоторым грибам (Penicillium granulatum, Fusarium solani), но не подавляли роста других (Aspergillus niger, Trichophyton gypseum).

Обсуждение

Результаты морфолого-культуральных исследований, свидетельствуют с несомненностью о том, что выделенный из почвы микроорганизм принадлежал к порядку Actinomycetales Buchanan по следующим основным признакам: наличию истинного, ветвящегося, обычно несептированного мицелия толщиной 0,3—0,8 *мк* и по характеру роста колоний на плотных питательных средах (Красильников, 1949).

Актиномицет имеет существенные особенности в строении репродуктивных органов, которые заключаются в образовании преимущественно односпоровых спорангиев с игольчато-зубчатой оболочкой. Развитие

этих органов идет, как нам представляется, по следующей вероятной схеме (рис. 15).

Процесс формирования спорангия начинается с возникновения на конце или боковой части гифы грушевидного вздутия (*а*). Далее содержимое вздутия перешнуровывается перегородкой (*б*) и дистальная часть его, продолжая увеличиваться, формируется в спору (*в*). Базальная часть вздутия, являющаяся концом спорагиеносца и находящаяся под общей со спорой оболочкой, либо останавливается в росте (*г*), либо дает начало образованию еще 1—2 спорам (*д*). Одновременно с этим происходит завершение формирования спорангиальной оболочки с образованием выростов на ее внешней поверхности или без них. Возможно, выросты имеют такую же природу, как и шипики на поверхности спорангиев мукоровых грибов, у которых они состоят из отложений оксалата кальция (Курсанов, 1940). При разрушении спорангия освобождаются круглые или овальные гладкие споры (*е*).

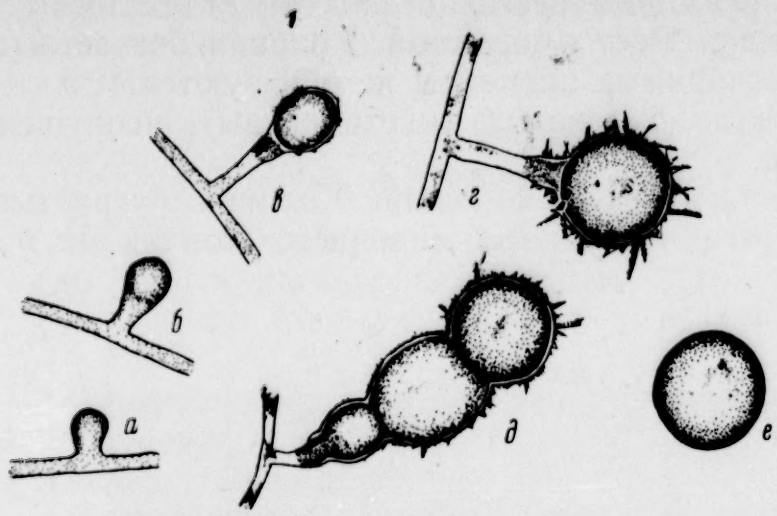

Рис. 15. Схема процесса формирования спорангиоспор Microechinospora grisea. Пояснения в тексте

Мы сравнили морфологические признаки изучаемого микроорганизма с описаниями таковых у известных родов актиномицетов, с которыми он имеет сходство по способу образования немногочисленных спор на конце спороносущей гифы или образованию чехла-оболочки вокруг спор. В нашем распоряжении имелись некоторые виды, представители указанных ниже родов (кроме Actinobifida). Данные литературы и собственных наблюдений сведены в таблицу. В таблице не приведены описанные недавно Коучем (Couch, 1963) новые роды актиномицетов, существенно отличающиеся от выделенного нами микроорганизма.

Из таблицы видно, что обособляемый нами род Microechinospora отличается от всех других родов актиномицетов наличием чехла с игольчато-зубчатыми выростами и от каждого рода в отдельности — по ряду существенных морфологических признаков. При экспериментальном сравнении культур нами отмечено, что Microechinospora по внешним признакам занимает промежуточное положение между родом Micromonospora Oerskov (1923) семейства Micromonosporaceae Krassilnikov, (1941) и родом Microellobosporia Cross, Lechevalier M. P. *et* Lechevalier H. (1963) семейства Actinoplanaceae Couch (1955). С первым родом новый микроорганизм сближает способ образования спор, а именно, формирование одиночных спор на спороносущих гифах. Отличием для Microechinospora от Micromonospora является:

1) образование вокруг воздушных спор чехла-оболочки с выростами; 2) наличие более или менее развитого вздутия у дистального конца воздушной спороносущей гифы, развивающегося иногда в 1—2 добавочные споры; 3) более крупные размеры спор; 4) образование спор на воздушном и субстратном мицелии (таблица).

Роды Microellobosporia и Microechinospora имеют аналогичные по размеру одиночные или немногочисленные споры, расположенные в один ряд и одетые в общий чехол-оболочку, т. е. образующие спорангии, в

Сравнение морфологических признаков репродуктивных органов Microechinospora gen. nov. и близких ему родов актиномицетов

Наименование рода	Наличие и форма спорангиев	Количество спор на конце спороносца или в спорангии	Размер спор (спорангиеспор), *мк*	Поверхность споровой оболочки	Расположение репродуктивных органов
Micromonospora Oerskov, 1923	Не обнаружены	Одиночные	0,8—1,5	Гладкая	Одиночное, гроздевидное на субстратном мицелии
Promicromonospora Krassilnikov, Kalakuzki et Kirillova, 1961 (Красильников Н. А., Калакуцкий Л. В. и Кириллова Н. Ф., 1961)	»	»	0,7—1,2	»	То же
Waksmania (Microbispora) Lechevalier et Lechevalier, 1957	»	Парные	1,5—2,0	»	Гроздевидное и продольное на воздушном мицелии
Micropolyspora Lechevalier, Solotorovsky et McDurmont, 1961	»	2—10	1,5	Слабобородавчатая	По осевой гифе или одиночно на субстратном и воздушном мицелии
Actinobifida Krassilnikov et Agre, 1964 (Красильников Н. А. и Агре Н. С., 1964)	Имеется слизистая капсула				
Actinosporangium Krassilnikov et Juan, 1961 (Красильников Н. А. и Юань Цзи-шэн, 1961)	Шаровидные псевдоспорангии	Одиночные	около 2	Шиповидная	Дихотомическое, на воздушном и субстратном мицелии
Actinoplanes Couch, 1949	Спорангии шаровидные или неправильные	Множественные или в цепочке	около 1	Гладкая	На воздушном мицелии
		Множественные	1—1,5	Гладкая со жгутиками	То же
Streptosporangium Couch, 1955	Спорангии шаровидные	»	1,8—2,0	Гладкая	» »
Microellobosporia Cross, Lechevalier M. P. et Lechevalier H., 1963	Спорангии булавовидные	2—7	1,5—3,5	»	По осевой гифе или одиночно на воздушном и субстратном мицелии
Microechinospora gen. nov.	Спорангии шаровидные и грушевидные с выростами	Одиночные, редко встречаются по 2—3	1,8—3,5	»	То же

связи с чем оба рода могут быть отнесены к семейству Actinoplanaceae. Однако род Microechinospora имеет и существенные отличия: 1) образует игольчато-шиповидные выросты на внешней поверхности спорангиальной оболочки; 2) спорангиальная оболочка плотно облегает споры и булавовидное вздутие, оболочка не образует складок и почти не оставляет свободного пространства внутри спорангия, которое могло бы быть заполнено жидкостью, как это отмечено у Microellobosporia (Rancourt, Lechevalier, 1963); 3) формирует только односпоровые спорангии на субстратном мицелии и, как правило, одиночные споры в спорангиях на воздушном мицелии, в связи с чем эти структуры правильнее называть спорангиолями, а не спорангиями. Полагают, что спорангиоли по биологической функции являются переходной формой между конидиями и более сложной структурой — спорангиями (Курсанов, 1940).

Итак, подводя итог изложенному выше, следует заключить, что экспериментальное сравнение культур различных актиномицетов подтвердило существенные отличия выделенного макроорганизма и, следовательно, правомочность обособления нового рода. По нашему мнению, описанный род Microechinospora gen. nov. вследствие обнаружения у него спорангиальных структур, следует отнести к семейству Actinoplanaceae Couch (1955).

Краткий диагноз Microechinospora grisea gen. nov., sp. nov.

Микроорганизм хорошо растет на большинстве общепринятых для актиномицетов средах. Воздушный мицелий и репродуктивные органы — спорангии — лучше образуются на некоторых плотных средах с растительными экстрактами. Спорангии шаровидной или грушевидной формы, размером 2,0—3,5×3—6 *мк*, расположены одиночной или гроздевидно на субстратном и воздушном мицелии. Спорангии заключают в себе булавовидную часть спороносца и одну — редко две-три шаровидные или овальные, расположенные в один ряд споры размером 1,8—3,5 *мк*. Внешняя поверхность спорангиальной оболочки имеет выросты в виде зубчатых игл (echinatus) и шипов.

Окраска спорулирующего воздушного мицелия вначале беловатая, затем становится зеленовато-серой до темно-серой (griseus).

Колонии крупные, бугристые, хрящевидной консистенции, бесцветные или палевые и светло-розовые. Культура не образует мелановидных пигментов, не окрашивает субстратов. Желатину разжижает. Молоко пептонизирует слабо. Нитраты не восстанавливает. Усваивает глюкозу, фруктозу, ксилозу, арабинозу, галактозу, мальтозу, лактозу, сахарозу, рафинозу, крахмал, инулин, маннит, рамнозу, лимоннокислый и яблочнокислый натрий. Не растет на среде с сорбитом и целлюлозой. Обладает антагонистической активностью по отношению к некоторым грибам. Лучше растет при 37°. Аэроб. Местообитание — песчаная почва пустыни.

Выводы

Из почвы пустыни Кызыл-Кум выделен и изучен мезофильный актиномицет, отличающийся по морфолого-культуральным признакам от ранее описанных. Культура выделена в новый род Microechinospora (Konev, Tsyganov, Minbaev, Morosov) gen. nov. с типовым видом Microechinospora grisea (Konev, Tsyganov, Minbaev, Morosov) sp. nov.

Ленинградский
научно-исследовательский
институт антибиотиков

Получено 14.IX.1965 г.

ЛИТЕРАТУРА

Бондарцев А. С. 1954. Шкала цветов. Изд-во АН СССР.
Красильников Н. А. 1949. Определитель бактерий и актиномицетов. М.— Л.
Красильников Н. А. 1950. Актиномицеты-антагонисты и антибиотические вещества. М.— Л.
Красильников Н. А., Агре Н. С. 1964. Микробиология, XXXIII, 935.
Красильников Н. А., Калакуцкий Л. В., Кириллова Н. Ф. 1961. Изв. АН СССР. Сер. биол., № 1, 107.
Красильников Н. А., Юань Цзи-шэн. 1961. Изв. АН СССР. Сер. биол., № 1, 113.
Курсанов Л. И. 1940. Микология. Изд-во Наркомпроса РСФСР. М.
Couch J. H. 1949. J. Elischa Mitchell Scient. Soc., **65**, 315.
Couch J. H. 1955. J. Elischa Mitchell Scient. Soc., **71**, 148.
Couch J. H. 1963. J. Elischa Mitchell Scient. Soc., **79**, 53.
Cross T., Lechevalier M. P. a. Lechevalier H. 1963. J. Gen. Microbiol., **31**, 421.
Lechevalier H., Solotorovski M. a. McDurmont. 1961. J. Gen. Microbiol., **26**, 11.
Lechevalier M. P. a. Lechevalier H. 1957. J. Gen. Microbiol., **17**, 104.
Oerskov J. 1923. Investigation into the morphology of the ray fungi. Kopenhagen. Levin a. Munksgaard.
Pridham T. G. a. Gottlieb D. 1948. J. Bacteriol., **56**, 107.
Rancourt M. a. Lechevalier H. 1963. J. Gen. Microbiol., **31**, 495.
Waksman S. A. 1961. The actinomyces, vol. 2, Baltimore, Williams a. Wilkins Co.

A NEW GENUS OF THE ACTINOMYCETALES — MICROECHINOSPORA GEN. NOV.

Yu. E. Konev, V. A. Tsiganov, R. Minbaev and V. M. Morosov

A new microorganism — Microechinospora grisea gen. nov. sp. nov. was isolated from sands of the Kisil—Kum desert.

Spherical or elongated sporangia 2—3.5×3—6 μ are produced on both substrate and aerial mycelium. Sporongia are single or grouped in clusters. Substrate sporangia contain single spore. Aerial sporangia sometimes contain 2—3 spores. Spores are spherical and oval, 1.8×3,5 μ, have a smooth surface. The sporangial wall which tightly covers spores and the club-like tips of the sporangiophores often bears spiny appendages.

The culture grows well on usual nutritional media. The colonies are leathery in appearence, reddish or yellowish. The air mycelium is blue-grey.

No soluble pigments are produced. Cellulose and sorbitol are not utilized among 17 the carbon sources tested .

Growth is good at 37° C. No growth at 50° C. Aerob. Antagonistically active against certain fungi.

1967

EVANS, G., CARTWRIGHT, J.B., & WHITE, N.H.

The production of a phytotoxin, nectrolide, by some root-surface isolates of Cylindrocarpon radicicola, Wr.

Pl. Soil, 26 (2): 253-260. [1 fig., 2 tables, Agric. Res. Stn, Tamworth, N.S.W.]

Microfilm no. 14199

Soil Sci. **70**, 19–26 (1950).

27 Wilson, L. G., Metabolism of sulfate; sulfate reduction. Ann. Rev. Plant Physiol. **13**, 201–24 (1962).

28 Wood, J. G., Metabolism of sulfur in plants. Chron. Baton. **7**, 1–4 (1942).

Plant and Soil XXVI, no. 2 April 1967

THE PRODUCTION OF A PHYTOTOXIN, NECTROLIDE, BY SOME ROOT-SURFACE ISOLATES OF *CYLINDROCARPON RADICICOLA*, Wr.

by G. EVANS, J. B. CARTWRIGHT and N. H. WHITE*

INTRODUCTION

Cylindrocarpon radicicola Wr. (perfect stage *Nectria radicicola* Gerlach & Nilsson) is a common root-surface inhabitant of many plant species. Kurbis [9] first recognised its relationship to plant roots and used the term "companion fungus" to describe the closeness and frequency of the association between *C. radicicola* and the roots of ash. The fungus is also reported as a common isolate from healthy roots of many other plant species [8 12 16 17], and some aspects of its distribution and status in the soil were studied [10]. The ecological niche of this fungus appears to be the root surface [11], and as a result *C. radicicola* has been isolated from diseased roots and is credited with having pathogenic propensities. The pathogenicity of the species is reviewed in two recent publications [6 13].

Although Wilhelm [18] was unable to demonstrate the pathogenicity of *C. radicicola* from microtome sections of unthrifty strawberry roots, the predominance of isolates of this organism from the roots of unhealthy plants led him to suggest that toxic metabolites produced by the fungus might be responsible for premature senescence and death of strawberry plants growing in California. The species is also a frequent isolate from the roots of stunted blackbutt

* Respectively, former Research Student, Faculty of Agriculture; Teaching Fellow, Department of Botany; and Professor of Plant Pathology, The University of Sydney, Australia.

Present address of the Senior Author: Agricultural Research Station, Department of Agriculture, Tamworth, N.S.W., Australia.

(*Eucalyptus pilularis* Sm.) seedlings [3], a pathological condition which was previously suggested [5] as the result of microbial antagonism in soil. Investigations [3] have shown that these isolates can reproduce typical symptoms of the disease without actively invading seedling roots.

The present communication reports the production of a phytotoxic compound, for which the name nectrolide was proposed [4], by strains of *C. radicicola* isolated from plant roots.

MATERIALS AND METHODS

For experimental purposes, *C. radicicola* was grown in still-surface culture on 50-ml aliquots of liquid medium in 150-ml Erlenmeyer flasks. The flasks were inoculated with a inch discs of *C. radicicola* cut from 14-day-old cultures growing on potato dextrose agar and incubated at 25°C. At intervals after inoculation the cultures were harvested and the mycelium removed by filtration. The contents of six flasks were bulked and assayed for nectrolide.

Culture filtrates were assayed for nectrolide by direct isolation of the compound. Nectrolide was isolated by extracting 200 ml of culture filtrate twice with 100 ml of ether and the ether was washed with 50 ml of 1% sodium bicarbonate. The ether was evaporated to a small volume (10–15 ml) and transferred to 1 × 4 inch specimen tubes and evaporated to dryness at room temperature. The residues were then dried *in vacuo* and weighed by difference. Nectrolide was usually obtained as colourless, needle-shaped crystals, but occasionally the residues were contaminated with traces of pigment and gum.

Dry weight of mycelium from the six flasks was recorded as a measure of growth rate on different media. Mycelium was washed in water and dried at 80°C for 24 hours.

RESULTS

(a) *The isolation of nectrolide from liquid cultures*

Nectrolide was isolated from filtrates of 16-day-old cultures of a strain of *C. radicicola* obtained from unthrifty strawberry plants and designated herein as B. 7. About 60 g of nectrolide were isolated from 1,200 l of culture filtrate. Analysis of nectrolide established the formula $C_{16}H_{24}O_4$ mp 208–209°C. The physical and chemical properties of nectrolide [7] show that it is identical with the antibiotic brefeldin A [12], an antibiotic produced by *Penicillium brefeldianum* Dodge.

(b) Effect of composition of the growth medium on the production of nectrolide

C. radicicola was grown on four media commonly used for the production of antibiotics in liquid culture, *viz* Weindling, Czapek-Dox, Raulin-Thom and cornsteep media. These media were prepared according to the methods described by Brian, Curtis and Hemming [2] with the exception that the concentration of glucose in Czapek-Dox medium was reduced from 5 to 3 per cent. Inoculated flasks were harvested after 5, 7, 10, 14, and 21 days and assayed for nectrolide content (Table 1).

TABLE 1

Nectrolide yields from culture filtrates of *Cylindrocarpon radicicola* (Strain B-7) grown on four liquid media and associated pH and growth rate recordings

Days growth at 25°C	Medium*			
	CD	W	RT	CSM
	Nectrolide residue (μ g/ml)**			
5	20 (0)	20 (2)	31 (1)	33 (4)
7	38 (0)	30 (2)	15 (1)	40 (4)
10	47 (0)	34 (2)	30 (1)	40 (3)
14	47 (0)	47 (2)	67 (1)	40 (3)
21	87 (0)	49 (2)	120 (1)	60 (3)
	pH			
5	5.5	3.9	3.7	4.0
7	5.4	3.4	3.3	4.0
10	6.2	3.4	3.2	4.0
14	7.9	4.0	4.0	4.2
21	8.5	4.2	5.8	4.4
	Dry weight of mycelium (g)			
21	1.26	1.14	1.85	5.01

* CD = Czapek-Dox medium; W = Weindling medium; RT = Raulin-Thom medium; CSM = Cornsteep medium.

** The figures in brackets denote the degree of purity of the nectrolide residues
0 = no obvious contamination by gum or pigment
1 = contamination by trace amounts of pigment only
2 = contamination by trace amounts of gum and pigment
3 = relatively heavy contamination by gum and pigment
4 = heavy contamination by gum and pigment

C. radicicola grew rapidly on Czapek-Dox, Raulin-Thom and Weindling media and after 7 days incubation well-developed mycelial felts covered the liquid media. On cornsteep medium *C. radicicola*

made little growth during the first 7 days incubation, but after a further 3 days the fungus grew rapidly and produced heavily folded mycelial felts on the liquid surface. From Table 1 it can be seen that nectrolide yield was correlated neither with growth rate nor with pH of the culture medium, high yields of the compound being obtained in the range pH 3.2 to 8.5. Nectrolide residues isolates from cornsteep medium were contaminated with large amounts of pigment and gum and the figures recorded in Table 1 are therefore misleading.

(*c*) *A comparison of nectrolide yields from twelve root isolates of C. radicicola*

A number of strains of *C. radicicola* were obtained from different research centers and used to inoculate Czapek-Dox liquid contained in 150 ml Erlenmeyer flasks. At intervals of 7, 10, and 14 days after inoculation the contents of six flasks were assayed for nectrolide. Table 2 shows nectrolide yields from twelve root isolates of *C. radicicola*, eight other isolates did not yield nectrolide in liquid culture.

(*d*) *The effect of nectrolide on the growth of blackbutt seedlings*

The toxicity of nectrolide to blackbutt seedlings was examined by including the compound in Hoagland's solution solidified with 0.8% agar at concentrations of 0, 2, 4, 6, and 8 μg per ml. Blackbutt seeds were surface sterilized with mercuric chloride and germinated a-

TABLE 2

A comparison of nectrolide yields from twelve strains of *Cylindrocarpon radicicola* grown on Czapek-Dox liquid medium

Origin of *Cylindrocarpon radicicola*	Nectrolide residue (μ g/ml) Days growth at 25°C				
	5	7	10	14	21
Strawberry roots (California)	22	29	45	53	71
Strawberry roots (California)	18	29	37	45	52
Olive roots (California).	25	34	42	62	78
Olive roots (California).	22	36	48	60	75
Olive roots (California).	23	35	57	64	82
Ryegrass roots (New Zealand)	32	57	82	80	84
White clover roots (New Zealand). . . .	17	32	40	55	62
Ryegrass roots (New Zealand)	15	39	53	82	76
Ryegrass roots (New Zealand)	25	39	58	74	75
Blackbutt roots (Australia).	15	38	59	60	72
Blackbutt roots (Australia).	12	23	28	31	30
Blackbutt roots (Australia).	28	42	50	62	70

septically in sand culture. Two germinated seedlings were then placed onto 20 ml of sterile antibiotic medium contained in 1 × 6 inch specimen tubes. Plants were kept at 900 ft-c, supplied in 12 hour photoperiods with a diurnal temperature range from 22°C in the light period to 18°C in the dark. The effect of nectrolide on the growth of blackbutt seedlings can be seen in Fig. 1. At a concentration of 6 μg per ml nectrolide arrested the growth of germinated seedlings, whilst at lower concentrations the antibiotic caused marked stunting and blackening of the roots. These effects are characteristic of the symptoms induced when seedlings plants in aseptic culture are inoculated with *C. radicicola* or when seedlings are grown in infested forest soil.

A number of preliminary experiments using purified nectrolide applied to plant roots have resulted in the compound being absorbed by the roots of blackbutt seedlings growing in forest soils. The compound has been crystallised from ether extracts of tomato roots supplied with the pure compound and can be detected in stem tis-

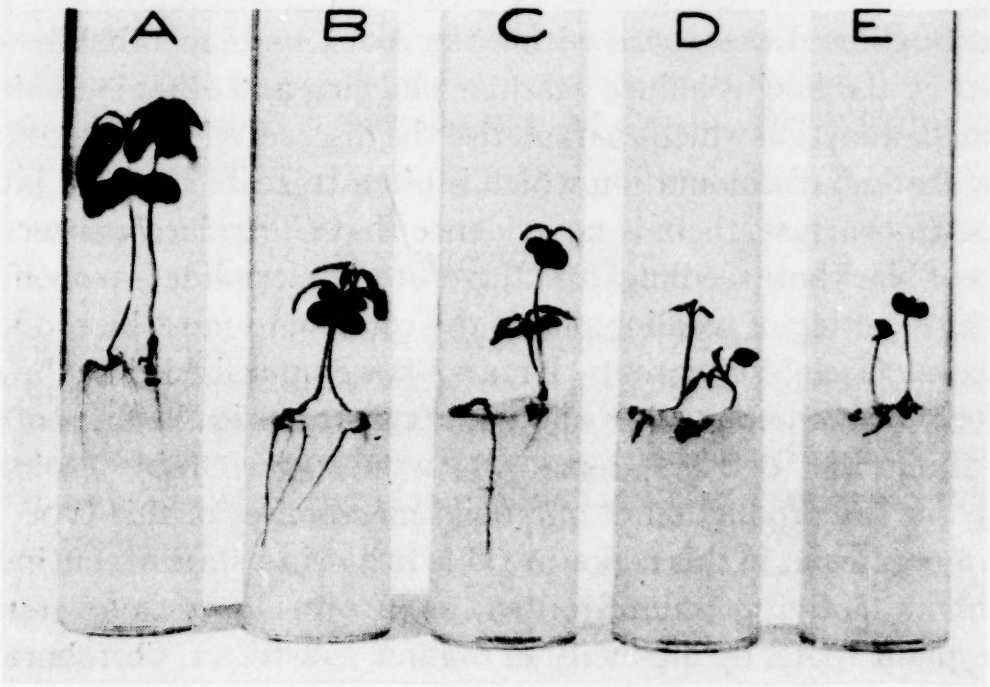

Fig. 1. Stunting of germinated blackbutt seedlings induced by nectrolide. **A** Normal seedlings growing in the absence of nectrolide. **B**, **C** Blackbutt seedlings stunted by nectrolide at concentrations of 2 and 4 μg/ml respectively. Seedling roots are blackened and failed to develop laterals. **D**,**E** Germinated seedlings which failed to grow in the presence of nectrolide at concentrations of 6 and 8 μg/ml respectively.

sues within 24 hours of watering nectrolide onto the roots. The presence of nectrolide in the tissues of treated plants was examined by thin layer chromatography. Ether extracts from plant tissues and pure nectrolide chromatographed on alumina, developed with acetone and sprayed with concentrated sulphuric acid or on silica gel and developed with ether–10% methanol gave R_f values of 0.62 and 0.66 respectively.

DISCUSSION

C. radicicola is commonly associated with a number of root diseases and the question now arises as to whether nectrolide is produced in nature, and if so, does the compound function as an agent of plant disease. Wilhelm [18] has indicated a sequence of events whereby *C. radicicola* gains access to the inner wood of two- and three-year-old main supporting roots of strawberry plants via the vascular connection to dead or senescent feeder rootlets. In the winter months plants harbouring *C. radicicola* fail to regenerate the mass of new rootlets necessary for vigorous growth in the following season. Wilhelm suggested that, once within the roots, toxic metabolites produced by the fungus induce vascular plugging and other evidence of xylem disfunction which characterise the disease. Affected roots also show marked discolouration which is often traceable to dead lateral roots. In contrast, there is no evidence that *C. radicicola* enters the roots of blackbutt seedlings and therefore, if nectrolide is responsible for the stunting of seedling plants the compound must be produced at the surface of living roots. Brian [1] has emphasised that the root surface, with an abundance of organic substrates in the form of root excretions and detritus, represents a most favourable ecological niche for the production of microbial metabolites of this type. Soil micro-organisms in this region are able to live in a state of continuous metabolic activity, uninterrupted, as in other areas more remote from plant roots, by a paucity of organic substrates. Corroborating evidence has been supplied recently [15] with the production of bulbiformin by *Bacillus subtilis* Cohn in the rhizosphere of plants growing in unsterilized soil. Much work remains to be done before nectrolide can be implicated as an agent of plant disease. However, the phytotoxic nature of this compound and the indications that nectrolide-producing strains of *C. radicicola* are widespread in nature provide

circumstantial evidence that this compound may function in a number of plant diseases, the causes of which have not been elucidated.

SUMMARY

A phytotoxic compound, for which the name nectrolide has been proposed, was isolated from *Cylindrocarpon radicicola*. Analysis of nectrolide and its physical and chemical properties show that the compound is identical with brefeldin A, an antibiotic produced by *Penicillium brefeldianum*.

Twenty different isolates of *C. radicicola* from plant roots were examined for their ability to produce nectrolide in liquid culture. Twelve of these yielded nectrolide at concentrations varying from 31 to 82 μg per ml when grown for 14 days on Czapek-Dox liquid medium. Eight isolates did not yield the metabolite in culture.

At a concentration of 6 μg per ml nectrolide arrested the growth of germinated blackbutt seedlings, whilst at lower concentrations (2–4 μg per ml) the compound caused severe stunting and blackening of the roots of seedling plants. Nectrolide watered onto blackbutt seedlings growing in forest soils can be detected in the roots after 24 hrs. The compound has been crystallised from ether extracts of tomato roots supplied with pure nectrolide and can be detected in stem tissues within 24 hours of watering it onto the roots.

As a result of the widespread association of *C. radicicola* with unthrifty plants and the phytotoxic nature of nectrolide, it is suggested that this compound may function in a number of plant diseases, the causes of which have not been elucidated.

ACKNOWLEDGEMENTS

This work was supported by the Wheat Industry Council Fund of Australia. The authors are indebted to Mr. G. B. Guise of the Organic Chemistry Department, The University of Sydney, for the chemical analysis of nectrolide and the chromatographic analyses of plant tissue extracts. They also wish to thank those people who supplied the different strains of *C. radicicola* used in these investigations.

Received December 7, 1965

LITERATURE CITED

1 Brian, P. W., The ecological significance of antibiotic production. Microbial Ecology. Symposium Soc. Gen. Microbiol. Cambridge Univ. Press, 168–188 (1957).

2 Brian, P. W., Curtis, P. J., and Hemming, H. G., Glutinosin; a fungistatic metabolic product of the mould *Metarrhizium glutinosum* S. Pope. Proc. Roy. Soc. B **135**, 106–132 (1947).

3 Cartwright, J. C., Unpublished data.
4 Evans, G., Ph.D. Thesis, The University of Sydney (1964).
5 Florence, R. G. and Crocker, R. L., Analysis of Blackbutt (*Eucalyptus pilularis* Sm.) seedling growth in a blackbutt forest soil. Ecology **43**, 670–679 (1962).
6 Gerlach, W., Beiträge sur Kenntnis der Gattung *Cylindrocarpon* Wr. IV. *Cylindrocarpon radicicola* Wr., seine phytopathologische Bedeutung und sein Auftretan als Erreger einer Fäule des Usambaraveilchens. Phytopath. Z. **41**, 361–369 (1961).
7 Guise, G. B., Personal communication (1964).
8 Kubikova, J., The surface mycroflora of ash roots. Trans. Brit. Mycol. Soc. **46**, 107–114 (1963).
9 Kurbis, W. P., Mykologische Untersuchungen über den Wurzelbereich der Esche (*Fraxinus excelsior* L.). Flora Jena **131**, 129–175 (1937).
10 Matturi, S. T. and Stenton, H., Distribution and Status in the soil of *Cylindrocarpon* species. Trans. Brit. mycol. Soc. **47**, 577–587 (1964).
11 Matturi, S. T. and Stenton, H., The Behaviour in Soil of spores of Four Species of *Cylindrocarpon*. Trans. Brit. Mycol. Soc. **47**, 589–599 (1964).
12 Rouatt, J. W., Peterson, E. A., Katznelson, H. and Henderson, V. E., Micro-organisms in the root zone in relation to temperature. Canad. J. Microbiol. **9**, 227–236 (1963).
13 Scholten, G., *Nectria radicicola* en *Thielaviopsis basicola* als parasieten van Cyclamen persicum. Neth. J. Plant Pathol **70**, Suppl. 2, 68 p. (1964).
14 Sigg, H. P., Die Konstitution von Brefeldin A. Helv. Chim. Acta **47**, 1401–1415 (1964).
15 Singh, P., Vasudeva, R. S., and Bajaj, B. S., Seed bacterization and biological activity of bulbiformin. Ann. Applied Biol. **55**, 89–97 (1965).
16 Taylor, G. S. and Parkinson, D., The growth of saprophytic fungi on root surfaces. Plant and Soil **15**, 261–267 (1961).
17 Thornton, R. H., Biological studies on some tussock-grassland soils. II. Fungi. New Zealand J. Agr. Research **1**, 922–938 (1958).
18 Wilhelm, S., Parasitism and pathogensis of root-disease fungi. In: Plant Pathology: Problems and Progress 1908–1958, p. 356–366 Univ. of Wisconsin Press (1959).

Plant and Soil XXVI, no. 2 April 1967

FORMS OF ORGANIC NITROGEN IN CLAY-AMENDED SAND SOIL *

by J. COLOM and A. R. WOLCOTT

Department of Soil Science, Michigan State University, East Lansing, Michigan

INTRODUCTION

Numerous investigators have shown that decomposition of plant residues, proteins and soil organic matter is retarded in the presence of expanding lattice clays [1 6 8 9]. In the case of proteins, attraction between positively charged amino groups and the negatively charged external and internal surfaces of clay minerals provides protection against attack by microbial enzymes [2 4].

Although the protective action of clay on proteins can be shown in short term incubation studies, it does not appear to be effective in retaining whole proteins for any significant period of time in soils under natural conditions. Most of the amino acids normally found in plant and microbial proteins have been recovered from soil hydrolysates in quantities which account for 20 to 50 per cent of the total soil nitrogen. Nevertheless, they do not appear to be present as normal proteins. Rather, they are held in little understood complexes with lignin or carbohydrates, or, more likely, with degradation products of lignin, carbohydrates and other constituents of decomposing plant or microbial residues [4].

Recovery of amino acids from soil hydrolysates in purified fractions suitable for identification and quantitative measurement requires rigorous ion exchange and elution procedures for dissociating amino acids from mineral and organic contaminants. Such procedures provide no information regarding the ways in which the

* Authorized for publication by the Director as Journal Article No. **3798** of the Michigan Agr. Exp. Sta., East Lansing. Present address of senior author: Department of Agronomy, University of Puerto Rico, Mayaguez, Puerto Rico.

MAC RAE, I.C. & CASTRO, T.F. 1967

Root exudates of the Rice plant in relation to akagare, a physiological disorder of Rice.

Pl. Soil, 26 (2): 317-323. [3 tables.
International Rice Res. Inst., Los Baños, Philippines.]

Microfilm no. 14200

13 Struthers, P. H. and Sieling, D. H., Effect of [illegible] precipitation by iron and aluminium by pH. Soil Sci. **69**, 205–213 (1950).

14 Swenson, R. N., Cole, C. V., and Sieling, D. H., Fixation of phosphate by iron and aluminium and replacement by organic and inorganic ions. Soil Sci. **67**, 3–22 (1949).

ANNEX 1

Properties of the soils used

Characteristics	Alluvial	Black	Red
1. Soil pH (1:2.5)	8.40	8.50	5.80
2. Free Fe_2O_3%	0.53	1.82	3.08
3. Free Al_2O_3%	0.28	0.51	0.28
4. Sorbed PO_4 (me/100 g)	0.10	0.05	0.29
5. Anion sorption capacity (me PO_4/100 g)	7.76	17.46	19.88
6. Cation-exchange capacity (me/100 g)	7.87	41.17	4.61
7. Exchangeable Ca (me/100 g)	6.00	32.50	2.60
8. Soil texture	Loam	Silty clay	Clay
9. Mineralogical composition of clay fraction			
i) Montmorillonite	Trace	Dominant	—
ii) Illite	Dominant	Trace	Trace
iii) Kaolinite	—	Trace	Dominant

Plant and Soil XXVI, no. 2 April 1967

ROOT EXUDATES OF THE RICE PLANT IN RELATION TO AKAGARE, A PHYSIOLOGICAL DISORDER OF RICE

by I. C. MAC RAE and TERESITA F. CASTRO*

INTRODUCTION

Following submergence, soils undergo reduction and a number of reduced inorganic and organic substances accumulate (Ponnamperuma [10]). Physiological disorders of the rice plant *e.g.* akagare (Japan), a disease characterized by reddish brown spots on the older leaves sometimes accompanied by blackening or rotting of the roots, have been attributed to the toxicities of several of these reduction products (Baba, Inada and Tajima [4]). Soils high in organic matter, and low in iron and manganese content, undergo rapid and severe reduction following flooding (Ponnamperuma [10]). Such soils have been associated with the occurrence of akagare (Baba *et al.*[4]). Also, potassium deficiency of rice plants, caused either by a poor soil supply of the element or from inhibition of root respiration by soil reduction products, has been suggested as a cause of akagare (Baba *et al.*[4]). Matsubayashi [8] found a positive correlation between the capacities of rice roots to oxidize alpha-naphthylamine and resistance to akagare. Varietal resistance to this disease has also been recorded by Matsubayashi [8] who concluded that varieties having a high carbohydrate content were able to supply an adequate level of substrate for root respiration, thereby preventing the inhibition of potassium absorption and the intrusion of toxic substances.

The mechanism which enables rice plants to transport oxygen from the top growth to the root cells (Van Raalte [14]) is undoubtedly one of the major factors enabling rice to survive in the anaerobic

* Soil Microbiologist and Research Assistant respectively, The International Rice Research Institute, Los Baños, Laguna, Philippines.

environment of a submerged soil. It has also been shown that rice roots excrete oxygen into this environment, thereby oxidizing the rhizosphere (Aimi [1]). The oxidation of the rhizosphere zone appears to be serving a protective function in preventing high concentrations of reduced substances from coming into contact with the root surface. Oxygen released by roots into the rhizosphere, may be expected to favor the development of a predominantly aerobic microflora in this zone. Sufficient carbohydrates or amino acids may be exuded by the roots to support a population of aerobes in the rhizosphere, and such organisms could be important in oxidizing some of the toxic products of soil reduction. The importance of root exudates in stimulating microbial development in the rhizosphere is now well established. Rovira [11] has listed a wide array of substances which have been identified in the root exudates of many plants. The rice plant, however, has received little attention in root exudate studies. The aims of the present investigation were to quantitatively determine the major carbohydrates and amino acids exuded by rice seedlings of akagare-resistant and susceptible varieties, and assess the relationship which might exist between root exudate components and resistance to the disease.

MATERIALS AND METHODS

(a) *Plant*

The *japonica* rice (*Oryza sativa*, L.) varieties, Norin 36, Norin 22, Norin 29, Norin 37 and Norin 32 were used. Norin varieties 36 and 22 have been recorded as susceptible and 29, 37 and 32 as resistant to akagare disease by Matsubayashi [8].

(b) *Plant culture*

Surface sterilization of seeds was effected in the following manner: shaking in 70 per cent ethyl alcohol for two minutes, washing with sterile distilled water, shaking with 0.2 per cent mercuric chloride for 30 minutes followed by repeated washing in sterile distilled water. The sterilized seeds were germinated on nutrient agar. After three days, germinated seeds free of contamination were transferred aseptically to test tubes (30 × 3.5 cm) containing 100 ml of plant nutrient solution (Ishizuka [6]). The seeds were supported on stainless steel gauze (2-mm mesh) placed in the tubes at the surface of the plant growth medium. The plants were incubated for 10 days at approximately 25°C and illuminated for 14 hours per day with fluorescent lights placed 30 cm from the plants. On the tenth day the seedlings were removed and the oven dry weight (70°C) of root tissue determined. The plant growth medium was analyzed for carbohydrates and amino acids.

(*c*) *Determination of carbohydrates*

The plant growth medium was evaporated to dryness at 30°C in a rotary-film evaporator and the carbohydrates in the residue were extracted with hot pyridine (Malpress and Morrison [7]). Pyridine was removed by vacuum distillation at a temperature not exceeding 40°C and the residue was taken up in water. The aqueous solution of carbohydrates was then shaken with a mixture of Amberlite ion-exchange resins IRA-120 and IR-400 to remove residual anions and cations not removed by the pyridine extraction. After separation from the resins, the solution was evaporated to dryness at 30°C in a rotary-film evaporator and the residue dissolved in 10 per cent isopropanol, when used for chromatographic determination of individual carbohydrates, and distilled water when the total carbohydrates were determined.

Total carbohydrates in the desalted root exudates were determined by the anthrone procedure (Ashwell [3]).

Individual carbohydrates in the root-exudate preparations were identified by paper chromatography. Aliquots of the solution were applied to the origin on sheets of Whatman No. 1 filter paper (8 inch × 20 inch) along with standardized mixtures of authentic glucose, sucrose, fructose, arabinose, xylose, raffinose, maltose, and cellobiose. The chromatograms were developed by the multiple development technique allowing the solvent (ethyl acetate: pyridine : water, 10 : 4 : 3) to descend four times. Carbohydrates were detected on one series of chromatograms by the silver nitrate technique (Trevelyan, Procter, and Harrison [12]), and on another series with p-anisidine (Mukherjee and Srivastava [9]). Quantitative estimates of individual carbohydrates in the root exudates were obtained by comparing the densities of spots revealed by silver nitrate and measured with an Electronic Densitometer Mod. 525 (Photovolt Corp., N.Y.) with calibration curves prepared for standardized amounts of authentic carbohydrates.

(*d*) *Determination of amino acids*

Amino acids in the root exudates were determined by elution chromatography using the Beckman-Spinco amino acid analyzer Mod. 120 (Beckman Instruments, Inc., Calif.). Prior to their introduction into the ion-exchange columns the root exudates were desalted by means of an electrolytic desalter (Research Specialties Co., Calif.). The identities and concentrations of the amino acids in the root exudates were determined by comparison with an analysis obtained for calibration mixtures of authentic amino acids.

RESULTS

(a) *Amino acid content of exudates*

Analysis of the root exudates of five rice varieties by elution chromatography revealed twenty ninhydrin-positive components. Quantitative estimates of those amino acids which could be identified by comparison with authentic amino acids are shown in Table 1.

TABLE 1

Amino acid analysis of root exudates of rice seedlings*

Amino acids	Norin varieties				
	Susceptible		Resistant		
	36	22	29	37	32
Lysine	1.12	0.30	0.24	0.20	0.25
Unidentified A	−	+	−	−	−
Unidentified B	−	−	+	+	−
Unidentified C	+	+	+	−	+
Unidentified D	+	+	+	+	+
Unidentified E	+	+	+	−	+
Unidentified F	+	−	+	+	+
Unidentified G	+	−	−	+	−
Aspartic Acid	0.03	0.08	0.21	0.09	1.16
Threonine	0.02	−	0.07	0.11	0.34
Serine	0.13	0.29	−	0.38	0.30
Glutamic Acid	−	−	−	0.04	0.02
Glycine	0.06	0.16	0.08	0.11	0.12
Alanine	0.04	0.01	0.09	0.08	0.09
Methionine	−	−	0.01	0.01	0.03
Isoleucine	0.05	0.01	0.01	0.12	0.01
Leucine	−	0.03	0.03	0.03	0.01
Unidentified H	−	+	+	+	−
Tyrosine	−	−	0.02	−	−
Phenylalanine	−	−	0.05	−	−

* All figures in mg per g root (dry weight).

Substances A, B and H eluted from the columns at positions which indicated that they are probably histidine, cysteic acid and glucosamine respectively. Root exudates of Norin varieties recorded to be resistant to akagare *viz* 29, 37 and 32, contained greater numbers of amino acids than the exudates of susceptible varieties. Methionine and glutamic acid were not detected in root exudates of susceptible varieties. Larger amounts of aspartic acid, threonine, serine and alanine but smaller amounts of lysine were found in the exudates from resistant varieties than from susceptible varieties. Lysine was one of the most abundant amino acids found in the exudates of all of the varieties tested.

(b) *Carbohydrate content of exudates*

The data of Table 2 show that glucose was generally more abundant in the exudates from resistant varieties than susceptible ones. While arabinose and xylose were detected in significant amounts, no

TABLE 2

Carbohydrate analysis of root exudates of rice seedlings*					
Carbohydrates	Norin varieties				
	Susceptible		Resistant		
	36	22	29	37	32
Glucose	0.6	1.0	0.9	2.0	2.5
Fructose	−	−	−	+	+
Arabinose	0.2	1.3	1.4	0.8	0.5
Xylose	0.3	1.0	0.9	0.5	0.3
Sucrose	−	+	+	+	+
Total Carbohydrates	8.0	8.2	12.4	18.4	25.1

* All figures in mg per g root (dry weight).

correlation with resistance was found. Fructose, detected on chromatograms with p-anisidine, while present in only small amounts, was only found in the exudates of two of the resistant varieties. However, when the total carbohydrate content of the exudates was assessed by the anthrone method, it was found that the root exudates of resistant varieties contained two or three times as much carbohydrate as the exudates from susceptible varieties (Table 2). Quantitative estimates of the known carbohydrates in the exudates *viz* glucose, arabinose and xylose accounted for 13 to 40 per cent of the values obtained for total carbohydrates. A number of reducing substances detected by silver nitrate were not identified. However, comparison of the R_f values of these unidentified spots with cited values for the same solvent (Hough and Jones [5]) indicates that they may be oligosaccharides.

DISCUSSION

In one of the few published studies on rice root exudates, Andal, Bhuvaneswari and Subba-Rao [2] found that the exudates from a variety resistant to foot rot disease caused by *Fusarium moniliforme* contained a greater number of amino acids than the exudates from a susceptible variety. These authors found eight amino acids in the exudates from the resistant variety and, of these, cystine, asparagine tyrosine, and methionine were lacking in the exudates from the susceptible variety. They also found that the concentration of aspartic acid in exudates from the resistant variety was approximately twice that of the exudates from the susceptible one. While the amino acid composition of the exudates of the rice varieties used in the

present study is somewhat different from that obtained by Andal *et al.*[2], the greater numbers of amino acids detected in the exudates of resistant varieties as opposed to the susceptible varieties, the presence of methionine only in the exudates of resistant varieties, and the greater abundance of aspartic acid in the exudates of resistant varieties (Table 1) are similar findings. Rice protein is low in lysine content and it was therefore surprising to find that this amino acid was one of the most abundant in the root exudates of the Norin varieties, in particular the akagare susceptible ones. Vancura and Hovadik [13] could not detect lysine in the exudates of barley and wheat.

The finding that exudates of akagare-resistant Norin varieties contained larger amounts of carbohydrate than the susceptible ones is interesting because Matsubayashi [8] found that the leaves and stems of the same resistant varieties had a higher total carbohydrate content than the leaves and stems of the susceptible ones. Also, Matsubayashi [8] has recorded the alpha-naphthylamine-oxidizing ability of the roots of these varieties in the following order of increasing activity: Norin 36 < Norin 22 < Norin 29 < Norin 37 < Norin 32, which is the same sequence obtained for carbohydrate content of the root exudates of these varieties (Table 2). It would be interesting to know if varietal differences exist in the amounts of oxygen excreted into the rhizosphere zone.

Large differences among rice varieties in the amounts and types of carbohydrates and amino acids in the root exudates, and the amounts of oxygen excreted, would be expected to have a profound effect upon the composition and magnitude of the rhizosphere microflora. While sterile growth of a seedling is far from comparable with growth of a plant in the field, the present findings suggest that the rhizosphere microflora may be implicated in varietal resistance to akagare.

SUMMARY

Two *japonica* rice (*Oryza sativa*, L.) varieties, Norin 36 and Norin 22, susceptible to the physiological disorder of rice known as akagare, and three varieties resistant to this disease *viz* Norin 29, Norin 37, and Norin 32, were chosen for root-exudate studies. Quantitative analysis of carbohydrates and amino acids occurring in sterile root exudates revealed major differences between resistant and susceptible varieties. The major amino acids found in the exudates were lysine, aspartic acid, threonine, serine, glutamic acid,

glycine, alanine, methionine, isoleucine, leucine, tyrosine, and phenylalanine. Root exudates of resistant varieties contained ten of these amino acids whereas exudates of susceptible varieties contained only seven. Methionine and glutamic acid were not detected in exudates of the susceptible varieties. Exudates from resistant varieties contained more aspartic acid, threonine, serine and alanine than the exudates of susceptible ones. Major carbohydrates detected were glucose, fructose, arabinose, xylose, and sucrose. Larger amounts of glucose were generally found in exudates from resistant varieties. The exudates from resistant varieties contained two or three times as much carbohydrate as the exudates from susceptible varieties when the total carbohydrates were assayed. The significance of these findings and their possible relation to the rhizosphere microflora and to akagare of the rice plant are discussed.

Received December 21, 1965

REFERENCES

1 Aimi, R., Cell physiological study on the function of the root. IV. Active oxygen supply into the root from leaves in rice plants. Proc. Crop Sci. Soc. Japan **29**, 51–54 (1960).

2 Andal, R., Bhuvaneswari, K., and Subba-Rao, N. S., Root exudates of paddy. Nature **178**, 1063 (1956).

3 Ashwell, G., Colorimetric analysis of sugars. *In*: Methods in Enzymology III (Eds. Colowick, S. P. and Kaplan, N. O.), p. 84–85. Academic Press Inc., New York (1957).

4 Baba, I., Inada, K. and Tajima, K., Mineral nutrition and the occurrence of physiological diseases. *In*: The Mineral Nutrition of the Rice Plant, p. 173–195. The Johns Hopkins Press, Baltimore, Maryland (1965).

5 Hough, L. H. and Jones, J. K. N., Chromatography on paper. *In*: Methods in Carbohydrate Chemistry I (Eds. Whistler, R. L. and Wolfrom, M. L. p. 21–31. Academic Press Inc., New York (1962).

6 Ishizuka, Y., Causal nature of toxic action of copper-ions on the growth of rice plant. I. On the toxic action of copperions to the growth of rice plant when a half of its roots is placed in the solutions of $CuSO_4$ with and without nutrients. J. Sci. Soil Manure Japan **14**, 248–263 (1940).

7 Malpress, F. H. and Morrison, A. B., Use of pyridine in the deionization of solutions for paper chromatography. Nature **164**, 963 (1949).

8 Matsubayashi, M., ed. Theory and Practice of Growing Rice. Fuji Publishing Co., Ltd., Tokyo (1963).

9 Mukherjee, S. and Srivastava, H. C., Improved spray reagent for the detection of sugars. Nature **169**, 330 (1952).

10 Ponnamperuma, F. N., Dynamic aspects of flooded soils and the nutrition of the rice plant. *In*: The Mineral Nutrition of the Rice Plant, p. 295–328. The Johns Hopkins Press, Baltimore, Maryland (1965).

11 Rovira, A. D., Plant-root exudates in relation to the rhizosphere microflora. Soils and Fertilizers **25**, 167–172 (1962).

12 Trevelyan, W. E., Procter, D. P. and Harrison, J. S., Detection of sugars on paper chromatograms. Nature **166**, 444–445 (1950).

13 Vancura, V. and Hovadik, A., Composition of root exudates in the course of plant development. *In*: Plant Microbes Relationships, p. 21–25. Publishing House of the Czechoslovak Academy of Sciences, Prague (1965).

14 Van Raalte, M. H., On the oxygen supply of rice roots. Ann. Jardin Botan. Buitenzorg. **50**, 99–113 (1940).

1967

RODRIGUEZ-KABANA, R.

An improved method for assessing soil-fungus population density.

Pl. Soil, 26 (2): 393-396. [1 fig., 1 graph, 1 table.

Auburn Univ., Ala.]

Microfilm no. 14201

Bangor, N. Wales

Received April 24, 1966

REFERENCES

1 Boggie, B., and Knight, A. H., Studies of root development in a grass sward growing on deep peat using radioactive tracers. J. Brit. Grassland Soc. **15**, 133–136 (1960).
2 Burton, G. W., De Vane, E. H., and Carter, R. L., Root penetration, distribution and activity in southern grasses measured by yields, drought tolerance and P^{32} uptake. *Agron. J.* **46**, 229–33 (1954).
3 Hellmers, H., Horton, J. S., Juhren, G. and O'keefe, J., Root systems of some chapparal plants in Southern California. Ecology **36**, 667–78 (1955).
4 Neilson, J. A., Autoradiography for studying individual root systems in mixed herbaceous stands. *Ecology* **45**, 644–46 (1964).
5 Pavlychenko, T. K., Quantitative study of the entire root systems of weed and crop plants under field conditions. Ecology **18**, 62–79 (1937).
6 Quinlan, J. D. and Sagar, G. R., An autoradiographic study of the movement of ^{14}C labelled assimilates in the developing wheat plant. Weed Research **2**, 264–73 (1962).
7 Racz, C. J., Rennie, D. A., and Hutcheon, W. L., The P^{32} injection method for studying the root system of wheat. Can. J. Soil Sci. **44**, 100–8 (1963).
8 Rogers, W. S. and Booth, G. A., The roots of fruit trees. Sci. Hort **14**, 27–34 (1960).
9 Russell, E. J., Soil Conditions and Plant Growth. Longmans, London (1961).
10 Troughton, A., Uptake of phosphorus-32 by the roots of *Lolium perenne*. Nature, Lond. **188**, 593 (1960).
11 Virtanen, A. I. and Laine, T., Investigations on the root nodule bacteria of leguminous plants. xxii. The excretion products of root nodules. The mechanism of N-fixation. Biochem. J. **33**, 412–27 (1939).

---

* Present address: Hebrew University of Jerusalem, Israel.

Plant and Soil XXVI, no. 2 April 1967

SHORT COMMUNICATION

An Improved Method for Assessing Soil-Fungus Population Density

Most conventional methods of estimating population density of soil fungi have certain innate disadvantages that make reproducibility uncertain or require excess glassware and time. Most methods proposed have been variations of the 'direct' soil-plating method of Warcup [8] or the long soil-dilution plate method described by Brierly *et al.* [1]. For reproducible delivery of minute soil samples in the direct soil-plate method, large numbers of plates are necessary. The difficulty of maintaining homogeneity in the soil-dilution method during serial pipetting can be overcome by use of magnetic stirrers, but any other errors made will be multiplied by the dilution factor. The short method proposed by Schenck and Curl [7] eliminates serial dilution but processes minute soil samples and employs hand-shaking prior to plating. James and Sutherland [4] have discussed other disadvantages of the serial dilution procedure.

This paper describes a syringe method that combines the large more representative soil samples of the dilution method and the simplicity of the direct methods. A preliminary report has been made [6].

Three comparisons of the syringe method with the dilution-plate and Warcup's soil-plate methods were performed. The procedures described by Johnson *et al.* [5] were followed for these 2 methods. A fresh sandy loam soil was used in the first comparison, and the same soil stock was used in the second comparison 4 weeks later. A heavy red clay soil was used for the third comparison.

A 25-g equivalent of oven-dry soil and a Teflon-coated magnetic bar (5 cm long) were placed into a 500-ml aspirator bottle with 225 ml of sterile water. The bottle, with tubing outlet covered by a rubber cap, was placed on a small magnetic stirrer and the soil suspension sampled while in motion by piercing the rubber cap with a sterile 14-gauge × 10.2-cm sharpened cannula on a syringe (Fig. 1, A). Approximately 2 ml of suspension were drawn into the syringe and individual drops were transferred into petri dishes (Fig. 1, B). Rose bengal agar containing 70 ppm streptomycin was poured and the plates incubated at 25°C for 4 days and fungi counted. The amount of soil delivered in each drop of suspension was determined by drying and weighing 10 drops in each of 4 tared weighing cups. Each determination was performed on the basis of 20 plates per soil sample. The average number of fungal colonies per

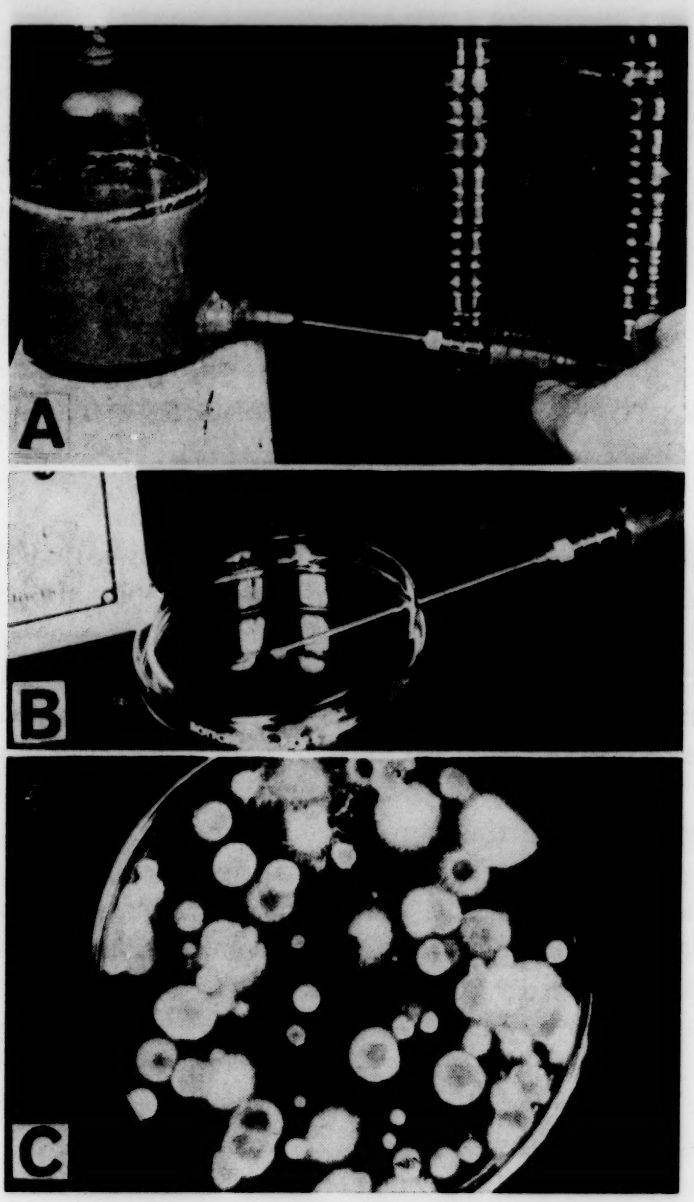

Fig. 1. The syringe method for isolating soil fungi: **A** – Soil suspension on magnetic stirrer sampled through rubber cap with cannula and syringe. **B** – Drop of suspension transferred to sterile petri dish. **C** – Typical plate of fungal colonies on medium 5 days later.

plate, or per gram of oven-dry soil, was related to the amount of soil in each drop of suspension. A study was made to determine uniformity of the amount of soil delivred in each drop of suspension and to select the desired time of stirring. Data were analyzed by a modification of Duncan's multiple range test [2].

In the initial test with a fresh sandy loam soil of moderate fertility, numbers of fungal colonies per gram of oven-dry soil where significantly higher with the syringe method at both 1 and 5% levels of probability than with Warcup's method (Table 1). Differences between the syringe and dilution-plate methods were not significant in this comparison. Results of a second test, using the same soil stock 4 weeks after collection, revealed a significant difference at the 5% level of probability between the syringe and Warcup

TABLE 1

Comparison of three methods for determining soil fungal populations

Soil	Warcup soil-plate	Dilution series	Syringe method
Sandy loam	*22.36**	58.00	131.10
Sandy loam (4-wk old) .	*12.93*	63.00	93.33
Red loamy clay	*29.44*	*29.67*	149.70

* Figures represent thousands of fungal propagules/g of oven-dry soil. Figures in italics are significantly different from corresponding figure in syringe method.

methods. Again, there was no significant difference between the syringe method and the dilution method. However, the latter failed to show a reduction in numbers of fungi in this 4-week-old soil, whereas a reduction was clearly shown by the other methods.

A third comparison, with a red loamy clay of moderate to high fertility, revealed highly significant differences at the 1 and 5% levels between the syringe method and the Warcup and dilution-plate methods. A typical plate obtained by the syringe method is shown in Fig. 1, C. The number of fungi per gram of oven-dry soil was lower by Warcup's method than by the dilution-plate, but the difference was not significant. No important variation in species of fungi obtained was observed.

The study on uniformity of soil delivery indicated that, when the soil was in a suspended stage, the amount per drop of suspension delivred was relatively constant. After 3 min stirring time the soil was thoroughly suspended and any additional stirring did not affect the amount of soil delivered. Variation in weight of sandy loam soil per drop of suspension followed a

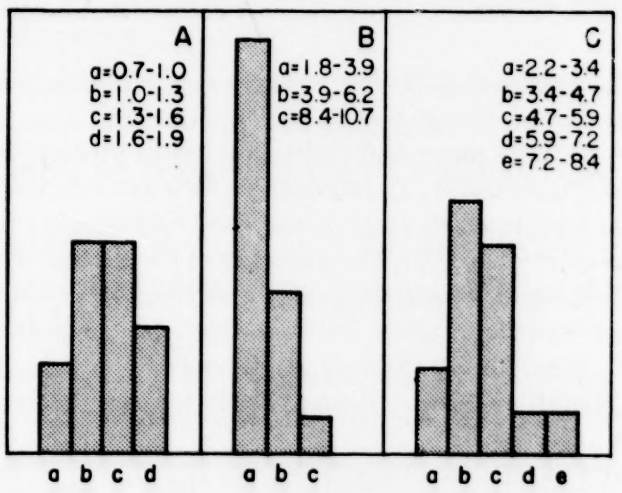

Fig. 2. Normal distribution of soil delivered: **A** – per ml of 10^{-2} dilution in dilution plate method. **B** – per plate in Warcup's method. **C** – per drop in the syringe method.

nearly perfect 'normal distribution' with the dilution-plate (Fig. 2, A) and syringe (Fig. 2, C) methods, but not with Warcup's method (Fig. 2, B).

This syringe method is simple and provides a high degree of accuracy and reproducibility. It is particularly superior with clay soils that have a large number of soil particles per unit volume of suspension. Hornby and Ullstrup [3] suggested that greater precision with magnetic stirring may be achieved by adding 1% carboxymethylcellulose to the soilwater system. A one-liter flask may be substituted for the aspirator bottle if desired without loss of accuracy. The method conceivably could be modified to include a study of bacteria.

Summary

A rapid method for determining soil fungal populations is described. A 25-g equivalent of oven-dry soil, in 225 ml of water in a 500-ml aspirator bottle, is agitated on a magnetic stirrer and samples withdrawn with a syringe while the suspension is in motion. Individual drops are placed in petri dishes and mixed with a suitable culture medium. The average weight of soil per drop is determined and colony counts related to dry weight of soil as usual. This syringe method is simple, eliminates much of the error common in serial dilution and pipetting, and allows for a high degree of reproducibility and possible standardization.

Acknowledgements

This study was supported in part by Public Health Service Grant EF-00639 from the Division of Environmental Engineering and Food Protection. Also acknowledged is the aid of Dr. E. A. Curl for photographs and critical review of the manuscript.

R. Rodriguez-Kabana
Department of Botany and
Plant Pathology
Auburn University, Alabama, USA

Received June 21, 1966

References

1 Brierley, W. B., Jewson, S. T. and Brierley, M., The quantitative study of soil fungi. Proc. First Intern. Congr. Soil Sci. **3**, 48–71 (1927).
2 Duncan, D. B., Multiple range and multiple F tests. Biometrics **11**, 1–42 (1955).
3 Hornby, D. and Ullstrup, A. J., Physical problems of sampling soil suspensions in the dilution-plate technique. Phytopathology **55**, 1062 (1965) (Abstr.).
4 James, N. and Sutherland, M., The accuracy of the plating method for estimating the numbers of soil bacteria, actinomycetes and fungi in the dilution plate. Can. J. Research C **17**, 72–86 (1939).
5 Johnson, L. F., Curl, E. A., Bond, J. H., and Fribourg, H. A., Methods for Studying Soil Microflora-Plant Disease Relationships. Burgess Publishing Co., Minneapolis, Minn. (1959).
6 Rodriguez-Kabana, R. and Funderburk, Jr., H. H., A method for assessing fungal density in herbicide-treated soils. Phytopathology **55**, 1073–1074 (1965) (Abstr.).
7 Schenck, N. C. and Curl, E. A., A short quantitative method for estimating the population density of soil fungi. Proc. Soil Crop Sci. Soc. Florida **21**, 13–17 (1961).
8 Warcup, J. H., The soil-plate method for isolation of fungi from soil. Nature **166**, 117–118 (1950).

Plant and Soil will contain original contributions, as well as short communications in English, French or German. No book reviews.

Each volume will comprise *ca* 480 pages and will consist of three issues, published bimonthly. Two volumes will be published each year.

The subscription price is fl. 51.— per volume. (In the Netherlands fl. 47.50).

Subscriptions should be sent to the publisher:

Martinus Nijhoff – 9 Lange Voorhout – P.O.B. 269 – The Hague (The Netherlands) or to any bookseller.

Publishers should note that PLANT AND SOIL does not print Book Reviews.

Notice to the Authors

1) Manuscripts submitted for publication and communications concerning editorial matters should be sent to the Executive Editors of *Plant and Soil*, Institute for Soil Fertility, van Hallstraat 3, Groningen, Netherlands.

2) Manuscripts must be written in English, French or German and must be typed double space on one side of the paper, with wide margins and *in duplicate*.

3) Papers already published in one of the above mentioned languages or under consideration elsewhere cannot be accepted.

4) It is recommended that papers be divided into sections, each headed by a caption (*viz* Introduction, Methods, Experimental Results, Discussion, Summary). Historical notes should be as brief as possible. Parts of the text may be marked for small print (description of methods and analytical procedures should always be marked for small print).

5) Each paper should be concluded by a brief and clear summary in one of the above-mentioned languages.

6) Tables should be provided with headings, and diagrams with descriptive text.

Diagrams should be drawn with black Indian ink on white or transparent paper or blue tracing paper, *in duplicate*, one set **with the lettering in ink,** one set in soft pencil.

7) References should be numbered in alphabetic order and should contain the names and initials of the authors and the title of the paper. The titles of the journals should be abbreviated in conformity with the "List of Periodicals abstracted by Chemical Abstracts" [Chem. Abstr. **50** (1956)]; *e.g.*: Winogradsky, S., Études sur les microbes fixateurs d'azote. Ann inst. Pasteur **40**, 455–520 (1926).

8) Authors will receive 50 reprints of their articles free of charge. Additional reprints can be purchased at a nominal price.

1967

DZAGANIYA, A.M.

Data on the characteristics of development of the pathogen of Olive spot in Georgia.

Soobshch. Akad. Nauk gruz. SSR, 46 (1): 199-205.
[Georgian. Abs. from Russ. summ.]

Microfilm no. 14202

საქართველოს სსრ მეცნიერებათა აკადემიის მოამბე, XLVI, № 1, 1967
СООБЩЕНИЯ АКАДЕМИИ НАУК ГРУЗИНСКОЙ ССР, XLVI, № 1, 1967
BULLETIN of the ACADEMY of SCIENCES of the GEORGIAN SSR, XLVI, № 1, 1967

ფიტოპათოლოგია

ა. ძაგანია

მასალები ზეთისხილის ჩოფურიანობის გამომწვევის განვითარების თავისებურებათა შესწავლისათვის საქართველოში

(წარმოადგინა აკადემიკოსმა ლ. ყანჩაველმა 3.10.1966)

ზეთისხილზე გავრცელებულ ავადმყოფობათა შორის თავისი მავნეობით მნიშვნელოვანი ადგილი უკავია ციკლოკონიოზს, ანუ ჩოფურიანობას.

საქართველოში ამ ავადმყოფობის გავრცელების შესახებ პირველ ცნობებს ა. რ ო ლ ო ვ ი [1] იძლევა. მისი ცნობით, ახალი ათონის ოლეარიებში სოკო პირველად იქნა ნახული 1897 წელს. ასეთივე ცნობებს ვპოულობთ ზ ო რ ა უ ე რ ი ს [2] შრომებშიც.

1914 წელს ავადმყოფობა ვ. ს ე მ ა შ კ ო ს [3] აღნიშნული აქვს სოხუმში. 1928 წელს პ. ნ ა გ ო რ ნ ი ს ა და ე. ე რ ი ს თ ა ვ ს [4] სოხუმსა და ახალ ათონში.

1945 წელს ლ. ყ ა ნ ჩ ა ვ ე ლ მ ა [5] აღწერა და საკმაოდ ვრცლად დაახასიათა აღნიშნული ავადმყოფობა.

1964—1966 წლებში ჩატარებული ჩვენი გამოკვლევებით, ციკლოკონიოზი ყველგანაა გავრცელებული, განსაკუთრებით დასავლეთ საქართველოს ტენიან სუბტროპიკულ რაიონებში (სოხუმი, ეშერა, ახალი ათონი, ბიჭვინთა, გაგრა, განთიადი, დრანდის მიდამოები, ხეთა, მაიაკოვსკი, საჩხერე, მახარაძე და სხვა), სადაც ავადმყოფობის გავრცელება 45—58 პროცენტს აღწევს.

აღმოსავლეთ საქართველოში (გურჯაანი, ლაგოდეხი) ავადმყოფობის გავრცელება 10 პროცენტს არ აღემატება, რაც ჰაერის სიმშრალითაა გაპირობებული.

ა ვ ა დ მ ყ ო ფ ო ბ ი ს ს ი მ პ ტ ო მ ე ბ ი. ციკლოკონიოზით ავადდება ზეთისხილის ფოთლის ფირფიტა და ყუნწი, იშვიათად ახალგაზრდა ტოტები და ხაყოფები. ფოთლის ზედა მხარეზე ჩნდება მუქი-ყავისფერი მომრგვალო ლაქები, ზომით 6—10 მმ; ხელსაყრელ პირობებში ლაქების რაოდენობა და ზომა იზრდება, ლაქები ერთმანეთს უერთდება და ფარავეს ეთელ ფირფიტას.

დასაწყისში ლაქა მუქია, შემდეგ ცენტრში მომწვანო-მონაცრისფრო ან მომწვახო-ძოყვითალო ფერისა ხდება, ლაქა შემორკალულია მწვანე-ნაცრისფერი ან ყავისფერი არშიით. ზოგიერთ ჯიშზე (ართვინური, აგოსტინო, კორეჯიოლო და სანტა-კატერინა) ლაქები ყავისფერი ან შავია, მაგრამ კონცენტრულად არაა შემორკალული. იშვიათად ვითარდება აგრეთვე მოთეთრო ლაქები, რომელიც მომწიფების შემდეგ ვერცხლისფერში გადადიან. ეს უკანასკნელი, როგორც ლიტე-

რატურულ წყაროებშია მითითებული [6]; შესაძლებელია სოკოსთან ერთად კუტიკულაში ჰაერის შეღწევის შედეგად წარმოიქმნას.

ფოთლის ყუნწზე ლაქა მუქი-ხავერდოვანია და მას ყავისფერი გადაჰკრავს. ყუნწდაავადებული ფოთლები ძლიერ ადრე ცვივა (დაავადებიდან მე-10-მე-15 დღეს). ნაყოფზე ლაქა ყუნწთან ახლო ვითარდება მომწვანო ლაქების სახით.

ციკლოკონიოზის გამომწვევი და მისი დახასიათება. ზეთისხილის ციკლოკონიოზს იწვევს სოკო *Cycloconium oleaginum* Cast. გამომწვევთან დაკავშირებით ავადმყოფობას ხშირად ციკლოკონიუმსაც უწოდებენ.

სოკოს მიცელიუმი ნაცრისფერია ან მოყვითალო-ნაცრისფერი, გასქელებული, დატოტვილი, მრავალუჯრედიანი, ბუნებრივ პირობებში ნაყოფიანობის დროს სოკო არღვევს კუტიკულას, ჰიფები ფოთლის ზედაპირზე ამოდის და ჰქმნის პატარა ამონაბურცებს, რომლებიც კონიდიოფორების დანიშნულებას ასრულებენ. კონიდიოფორები მუქი-ყავისფერია, მრგვალი ან მოგრძო, ზომით 12—14×10—12 მიკრონი.

სპორები კვერცხისებრია, იშვიათად თირკმლისებრი. კონიდიოფორებზე მიბაგრების მხრიდან განიერი და მომრგვალოა, მოპირისპირე მხარეს კი წაგრძელებულ-წამახვილებული; ორუჯრედიანია, იშვიათად—ერთუჯრედიანი, მოყვითალო-მწვანე ფერისა, ზომით 17—25×10,5×11მიკრ. მომწიფებულ კონიდებს აქვს ცხიმის წვეთები.

ხელოვნურ სუბსტრატზე ციკლოკონიუმი არ იძლევა ბუნებრივისაგან ძლიერ განსხვავებულ ნიშნებს, თუმცა უნდა აღინიშნოს, რომ კულტურაში სოკოს კოლონია სამ ფენად ვითარდება: ა) ქვედა ფენა სუბსტრატშია ჩაძირული. იგი თხელი ყავისფერი ჰიფებისაგანაა შემდგარი და ზოგჯერ დაყოფილია ქლამიდოსპორების მსგავსად; ბ) შუა ფენა მუქი ყავისფერი ან შავი მოკლე ჰიფებისაგან შედგება; გ) ზედა, ამობერილი ფენა შედგება მოყვითალო-ნაცრისფერი ჰიფებისაგან.

კონიდიუმების წარმოშობა ხდება უმთავრესად ზედა და შუა ფენის ჰიფებზე. კონიდიუმების წარმოშობის პროცესი შემდეგნაირად მიმდინარეობს: ჰიფას უჯრედის გვერდითი გარსი იხსნება და წარმოიქმნება პატარა ამონაბურთი. ეს უკანასკნელი იზრდება, ვიდრე ზომით წარმომშობი ჰიფას დიამეტრს არ გადააჭარბებს. შემდეგ იგი იკეთებს თხელ ყავისფერ გარსს, წაგრძელდება, უვითარდება ტიხარი და იღებს კვერცხისებრ ფორმას. ზოგჯერ ამონაბურთი უფრო სიგრძეზე იზრდება და ფორმირდება ცილინდრისებრი კონიდიუმები. კულტურაში კონიდიუმების ზომა 16,5—24×9,5—11 მიკრონი.

ციკლოკონიუმის მიცელიუმის განვითარების პირობები

ა. საკვები არეს გავლენა. ლიტერატურული მონაცემებით [7, 8, 9], სოკოს იზოლირება შესაძლებელია ზეთისხილის ფოთლების გამონახარშის გლუკოზიანი აგარის სუბსტრატზე. ამ საკითხის დასაზუსტებლად ჩატარებული ცდებით გამოირკვა, რომ ციკლოკონიუმის პირველადი იზოლაცია შესაძლებელია ზეთისხილის ფოთლების გამონახარშის 0,2 პროცენტ გლუკოზიან აგა-

რში ან გლუკოზირებულ კარტოფილ-აგარის სუბსტრატზე, მაგრამ უნდა აღინიშნოს, რომ ამ სუბსტრატებზე სოკოს ზრდა-განვითარება ძლიერ ნელა მიმდინარეობს (ორ თვეში 2 სანტიმეტრსაც არ აღემატება და წაყოფიანობის წარმოქმნაც 20—25 დღით იგვიანებს ასეთივე განვითარება აღინიშნება ლუდ-აგარაზე. შედარებით უფრო სუსტი ზრდა აღინიშნება ძიძოს ღეროზე. სტაფილოს სუბსტრატზე და განსაკუთრებით ჩაპეკის არეზე.

2. ტემპერატურის გავლენა მიცელიუმზე. ციკლოკონიუმის განვითარებაზე ტემპერატურის გავლენის გამოსაკვლევად სოკო პეტრის თასებში აგარიზებული ზეთისხილის ფოთლების გამონახარშ+გლუკოზის სუბსტრატზე ვთესავდით და სხვადასხვა ტემპერატურაზე ვათავსებდით. აღმოჩნდა რომ 5° C ტემპერატურაზე მიცელიუმი ზრდას იწყებს მე-10 დღეს და კოლონიის დიამეტრი ორ თვეში 8 მმ-ს არ აღემატება. ტემპერატურის მატებასთან ერთად სოკოს განვითარება თანდათან მატულობს, ოპტიმუმს აღწევს 16—20°C ტემპერატურაზე. კოლონიის დიამეტრი მე-10 დღეს 2 მმ-ია, ერთი თვის შემდეგ—9,5 მმ, ორი თვის შემდეგ კი— 22 მმ; 22—24°C ტემპერატურაზე სოკოს ზრდა შენელებულია და ორი თვის შემდეგ 1.8 მმ არ აღემატება; 26—28°C ტემპერატურაზე ზრდა კიდევ უფრო კლებულობს (ორი თვის შემდეგ კოლონია 5,7 მმ არ აღემატება), ხოლო 32°C ზრდა აღარ აღინიშნება, მაგრამ ცხოველმყოფელობას არ კარგავს და 20°C გადატანისას განვითარებას იწყებს.

ამრიგად, სოკოს განვითარების მინიმუმია 5°C, ოპტიმუმი 16—20°C, მაქსიმუმი 30°C.

3. pH-ის გავლენა. ციკლოკონიუმის ზრდა-განვითარებაზე გარემოს pH-ის გავლენის გამოსაკვლევად სოკოს მიცელიუმი გადატანილ იქნა ზეთისხილის ფოთლების გამონახარშის აგარიზებულ-გლუკოზიანი, სხვადასხვა რეაქციის მქონე სუბსტრატზე. ცდიდან დადგენილ იქნა, რომ სოკო სრულიად არ ვითარდება სუბსტრატზე, რომლის pH 2,3 უდრის. სუსტად ვითარდება 3,2-ზე pH. შედარებით უკეთ ვითარდება 4,5 pH-ზე და უფრო ინტენსიურად—5,2 pH სუბსტრატზე. საუკეთესო ზრდა-განვითარება აღნიშნულია 5,2—5,8 pH სუბსტრატებზე, რომლის დროსაც ნაყოფიანობას მე-20 — 22-ე დღეს იძლევა. pH 6 — 6,4 და 6,8 სუბსტრატზე სოკო ძალზე სუსტად იზრდება. სხვა pH-იან სუბსტრატებზე სოკოს ზრდა-განვითარება არ მიმდინარეობს. ცდის შედეგად დადგინდა, რომ ციკლოკონიუმი ზრდის პროცესში ცვლის სუბსტრატის pH სუსტ-მჟავე რეაქციამდე.

ციკლოკონიუმის სპორების განვითარების პირობები

1. ტემპერატურის გავლენა სპორების გაღივებაზე. ამ საკითხის შესასწავლად ჩვენ ჩავატარეთ ცდები „ღია წვეთის" მეთოდით. ამისათვის მზადდებოდა სპოროვანი სუსპენზია, რომლის წვეთები სასაგნე მინაზე გადატანის შემდეგ თავსდებოდა ნოტიო კამერაში და იდგმებოდა პოლითერმოსტატში. ცდა ჩატარდა ოთხი განმეორებით (თითოეულში ექვსი წვეთი). აღმოჩნდა, რომ სპორების გაღივება იწყება 5°C ტემპერატურაზე 24 საათში. 8°C-ზე 24 საათში გაღივება 9,5%-ს არ აღემატება. 12°C ტემპერატურა-

ზე გაღივება 18 საათის შემდეგ იწყება, 16°C-ზე კი — 4 საათის შემდეგ 24 საათში 61,7%-ს აღწევს. 20° ტემპერატურაზე გაღივება 2 საათში იწყება და 24 საათში 65,3%-ს აღწევს. შემდეგ გაღივება თანდათან მცირდება, 27°C-ზე 17,9%-ს, ხოლო 30°C-ზე—5,6%-ს არ აღემატება. ამრიგად, სპორების გაღივების მინიმუმი უდრის 5°C, ოპტიმუმი 16—20°C, მაქსიმუმი 30°C.

2. ბიოგენური ფაქტორების გავლენა. ციკლოკონიუმის სპორები ძლიერ სუსტად ღივდებიან წყალსადენის წყალში. უკეთესი გაღივების მისაღებად ჩატარდა ცდა 20°C ტემპერატურაზე. აღმოჩნდა რომ 24 საათში სპორები ყველაზე კარგად (65%) ღივდება, როცა წვიმის წყლის წვეთს ემატებოდა ზეთისხილის ფოთლის პატარა ნაჭრები ან ზეთისხილის ფოთლის გამონაწური. ასეთივე შედეგი მივიღეთ გლუკოზის სუსტ (0,1—0,2) ხსნარებში; ძლიერ (0,5—1,0) ხსნარებში გაღივება შედარებით შემცირებულია და 45%-ს არ აღემატება.

$MgSO_4$-ის, სტაფილოს, ლუდის ტკბილისა და ძიძოს ანაფხეკის სუსტ (0,1—0,2%) ხსნარებში გაღივება 35,7%-ს შეადგენს. ძლიერ (0,5—1%) ხსნარებში გაღივება შემცირებულია და 22—25%-ს არ აღემატება. წვიმის წყალში გაღივება 52%-ს უდრის. ლიმონის მჟავა (0,1—0,2—0,5 და 1%) უარყოფითად მოქმედებს სპორების გაღივებაზე (5—12%). წყალსადენიდან აღებულ საკონტროლო წვეთში გაღივება 10%-ს არ აღემატება.

ამრიგად, გაღივებას ხელს უწყობს ბიოსის ტიპის ნივთიერებათა მიმატება წვეთ წყალში. ასეთ დანიშნულებას ასრულებს ამ შემთხვევაში ზეთისხილის ფოთლების პატარა ნაჭრები ან გამონაწური. საზოგადოდ სპორების გაღივება შეძცირებულია და 65%-ს არ აღემატება.

3. ტენიანობის გავლენა. სპორების გაღივებაზე ტენიანობის გავლენის გამოსაკვლევად სასაგნე მინაზე გადატანილ მშრალ სპორებს ვათავსებდით სხვადასხვა შეფარდებით ტენზე (30—95—100%) ექსიკატორში. ტენი დაცული იყო სხვადასხვა კონცენტრაციის გოგირდის მჟავას ხსნარის გამოყენებით. საკონტროლო სპორებს წვიმის წვეთში ვაღივებდით (ბიოსით). ცდა გრძელდებოდა 48 და 20°C ტემპერატურაზე.

როგორც ჩატარებული ცდიდან გაირკვა, 48 საათის განმავლობაში სპორების გაღივება მცირდება 2,9%-მდე; 72—96—120 საათის განმავლობაში კი სპორები კარგავენ ცხოველმყოფელობას და არ ღივდებიან.

5. მზის სხივების გავლენა. მზის სინათლის გავლენის შესასწავლად სპორები სასაგნე მინაზე მოთავსების შემდეგ, გადაგვქონდა მზის სხივების მოქმედების ქვეშ. ექსპოზიციის დამთავრების შემდეგ სპორებს ვათავსებდით წყლის წვეთში და ვაღივებდით 20°C ტემპერატურაზე.

როგორც გამოირკვა, მზის სხივების პირდაპირი გავლენა უარყოფითად მოქმედებს სპორების გაღივებაზე. ნახევარ საათში ციკლოკონიუმის სპორების გაღივება ეცემა 29,5%-მდე, ერთ საათში—6,7%-მდე 1,5 საათში—0,3%-მდე.

სოკოს პათოგენობა და ინკუბაციური პერიოდის ხანგრძლივობა

ლიტერატურული მონაცემებით [6, 8, 9], ზეთისხილის ფოთლებზე ციკლოკონიუმის ინკუბაციური პერიოდი 10—12 დღიდან 2—3 თვეს უდრის. ამ საკითხის ჩვენს პირობებში დასაზუსტებლად ჩატარებულ იქნა ცდა ეშერის სასწავლო-მეურნეობაში. ამისათვის მცენარეების ფოთლები ხელოვნურად სენიანდებოდა წმიხდა კლუტურიდან აღებული სპორებით. დასენიანებას ვაწარმოებდით, როგორც მექანიკური დაზიანებით, ისე დაუზიანებლად. სპოროვანი სუსპენზიის შესხურების შემდეგ ტენიანობის შენარჩუნების მიზნით ფოთლებს ვათავსებდით ცელოფანის პარკებში, რომელშიც მცირე რაოდენობით ვასხამდით წყალს. ჩატარებული ცდებით დადგინდა, რომ მექანიკურად დაზიანებული ფოთლების ხელოვნური დასენიანების დროს 18—20,8°C ტემპერატურაზე და 95,7—100% შეფარდებითი ტენის დროს სოკოს ინკუბაციური პერიოდი 11—14 დღეს უდრის, მექანიკურად დაზიანების გარეშე კი ივი 28—32 დღემდე გრძელდება.

სოკოს გადაზამთრება და ინფექციის გზები

ლიტერატურული მონაცემებით [6], ციკლოკონიუმი იზამთრებს ნიადაგის ზედაპირზე ჩამოცვენილ დაავადებულ ფოთლებზე როგორც სპორების, ისე მიცელიუმის სახით. ამ საკითხის დასაზუსტებლად მავთულბადეში გახვეული დაავადებული ფოთლები მოვათავსეთ ნიადაგში სხვადასხვა (5, 10, 15 და 25 სმ) სიღრმეზე და ნიადაგის ზედაპირზე.

გაზაფხულზე აღრიცხვის ჩატარებისას გამოირკვა, რომ მიცელიუმს ყველა შემთხვევაში აქვს შენარჩუნებული სიცოცხლის უნარი; სპორების გაღივების უნარი კი სიღრმის მატებასთან ერთად კლებულობს. სპორების გაღივება უდრის: ნიადაგის ზედაპირზე 58%-ს, 5 სმ-ზე — 22,7%, 10 სმ-ზე—8,5%-ს, 15 სმ-ზე—2,5%-ს; 20 სმ-ზე კი სპორები არ ღივდებიან.

ზამთრის განმავლობაში მცენარეზე შერჩენილ დაავადებულ ფოთლებზე მყოფი სპორების გაღივების უნარის შესწავლიდან გამოირკვა, რომ მასალაზე სპორების გაღივება 1964 წ. 62,5%-ს უდრიდა, 1965 წ. კი—60%-ს.

ამრიგად, დასავლეთ საქართველოს პირობებში სოკოს შეუძლია გადაიზამთროს, როგორც ხეზე და ნიადაგის ზედაპირზე დარჩენილ, ისე ნიადაგში მოთავსებულ ფოთლებზე. რამდენადაც ღრმადაა ფოთოლი ნიადაგში, იმდენად უფრო სპორების გაღივების უნარი კლებულობს.

დასკვნები

1. ზეთისხილის ციკლოკონიოზი — *Cycloconium oleaginum* Cast. — ძლიერ გავრცელებული ავადმყოფობაა ყველგან, სადაც ზეთისხილის მოყვანას მისდევენ. საქართველოში იგი გავრცელებულია ყველგან. მეტწილად კი დასავლეთ საქართველოში, სადაც მისგან დაავადებულ ფოთოლთა რაოდენობა 85%-ს აღწევს.

2. ფოთოლზე ჩნდება მომრგვალო, ჯერ მუქი-ყავისფერი, შემდეგ ცენტრში მონაცრისფრო ან მომწვანო-მოყვითალო, გარშემო ასეთივე ნაცრის ან ყავის-

ფერის არშიით გარშემოვლებული ლაქები, რომლებიც ყუნწის ან ფირფიტის დაფარვის შემთხვევაში იწვევს უდროვოდ ცვენას და მოსავლის ძლიერ შემცირებას. ყუნწზე ლაქა მუქი ხავერდოვანია. სხვა ორგანოებზე იშვიათად ჩნდება.

3. ავადმყოფობის გამომწვევი ძლიერ ნელა ვითარდება, უკეთ იზრდება და ნაყოფიანობას იძლევა ზეთისხილის ფოთლის გამონაწური +0,2% გლუკოზას აგარზე ან ლუდის წვენის აგარზე 16—20°C ტემპერატურაზე. მინიმუმია 5°C, მაქსიმუმი 30°C.

4. სოკო უკეთ იზრდება და ნაყოფიანობს საკვები არეს pH 5,2—5,8 დროს

5. სპორების გაღივების ოპტიმალური ტემპერატურაა 16—20°C, მინიმუმი 5°C, მაქსიმუმი 30°C. სპორები ღივდება მხოლოდ მაღალ (100% ტენიანობის არეში და წვეთ წყალში. ცუდად ღივდებიან გამოშრობის შემდეგ (48 საათის შემდეგ გაღივება 2.9%-ს არ აღემატება). უფრო ცუდად იტანენ მზის სხივების პირდაპირ გავლენას (1 საათის შემდეგ გაღივება 6,7%-ს არ აღემატება).

6. სპორების გაღივებას ძლიერ უწყობს ხელს წყლის წვეთს მიმატებული ზეთისხილის ფოთლის პატარა ნაჭრები ან ზეთისხილისავე ფოთლის გამონაწური. ლიმონის მჟავა უარყოფითად მოქმედებს სპორების გაღივებაზე.

7. სოკო ძლიერ პათოგენურია. ინკუბაციური პერიოდის ხანგრძლივობა იცვლება იმისდა მიხედვით, დაზიანებულია თუ არა ფოთოლი მექანიკურად. 18—20.8°C ტემპერატურის დროს, მაღალი ტენიანობის არეში მისი ხანგრძლივობა მექანიკურად დაზიანებულ ფოთლებზე 11—14 დღეს უდრის, დაუზიანებელზე —28—32 დღეს.

8. ციკლოკონიუმი დასავლეთ საქართველოს პირობებში იზამთრებს, როგორც ხეზე და ნიადაგის ზედაპირზე დარჩენილ, ისე ნიადაგში მოთავსებულ ფოთლებზე. ნიადაგში სიღრმის მიხედვით სპორების გაღივების ენარი შემცირებულია.

საქართველოს სუბტროპიკული მეურნეობის ინსტიტუტი

(რედაქციას მოუვიდა 3. 10. 1966)

ФИТОПАТОЛОГИЯ

А. М. ДЗАГАНИЯ

МАТЕРИАЛЫ К ИЗУЧЕНИЮ ОСОБЕННОСТЕЙ РАЗВИТИЯ ВОЗБУДИТЕЛЯ «ОСПЫ» МАСЛИНЫ В ГРУЗИИ

Резюме

Циклокониоз маслины (*Cycloconium oleaginum* Cast.) распространен в Грузии повсеместно. Особенно интенсивное развитие болезни отмечается в Западной Грузии, где, по данным 1964—1966 гг., поражение оливковых плантаций циклокониумом составляет 45—58%.

Гриб поражает главным образом листья и черешки, а также молодые побеги, плоды и плодоножки маслины. Проявляется это заболева-

ные в виде темно-коричневых округлых пятен на верхней стороне листьев. Пораженные листья, сплошь покрытые пятнами, осыпаются.

Развитию болезни благоприятствует влажная погода весной. Продолжительность инкубационного периода циклокониума при температуре 18—20,8°С и относительной влажности 95,7—100% на механически поврежденных листьях равна 11—14 дням, а без механической поврежденности — 28—32 дням. Оптимальной температурой для роста и развития циклокониума является 17—20°С, максимальной 30°С и минимальной 5°С. Под влиянием солнечных лучей при температуре 40°С споры быстро (через 1 час) теряют жизнеспособность. Споры циклокониума прорастают только в капле воды (60%), а при 100% влажности на протяжении 48 часов количество проросших спор не превышает 18%. При относительной влажности 95% и ниже прорастание спор не наблюдалось.

Под влиянием сухости, при экспозиции 24 часа, прорастание спор циклокониума уменьшается до 12,5—14,7%. Внесением биоса (вытяжка из листьев маслины или 0,1—0,2% глюкозы) в каплю воды стимулируется прорастание спор. Добавление лимонной кислоты сильно снижает процент прорастания спор.

Для роста и развития гриба *Cycloconium oleaginum* Cast. наилучшей реакцией среды является pH 5,2. Циклокониум лучше перезимовывает на дереве и на поверхности почвы. Опыты показывают, что при хранении пораженных грибом листьев в почве жизнеспособность спор с глубиной уменьшается.

დამოწმებული ლიტერატურა — ЦИТИРОВАННАЯ ЛИТЕРАТУРА

1. А. Роллов. Разведение маслины. Тифлис, 1898.
2. P. Sorauer. Zeitschrift für Pflanzen Krankheiten, Band XI, 1901.
3. В. Семашко. Материалы к микологической флоре Сухумского округа, I. Труды Сухумской садовой и с/х опытной станции. Петроград, 1915.
4. П. Нагорный, Е. Эристави. Краткий обзор болезней растений Абхазии. Известия Абхазской с/х опытной станции, 38. Сухуми, 1928.
5. ლ. ყანჩაველი. სასოფლო-სამეურნეო კულტურების ავადმყოფობანი. ნაწ. II, თბილისი, 1945.
6. U. Brizi. Il vaiolo dell olivo (Cycloconium oleaginum Cast.) e il modo di combaterlo. Sfaz. Sper. Agr. Italia, 32, 1889.
7. M. Salerno. Oservazioni Sull'agente dell' Occhio di pavone dell' Olivo (Cycloconium oleaginum Cast.). Annali della Sper. Agr. N. S., vol. 12, № 3. Roma, 1958.
8. E. Wilson, N. Miller. Olive leaf spot ist control with fungicides. Hilgardia, 19, I, 1949.
9. P. Cambogi. Qualche notizie Sull' Occhio di pavone o cycloconio dell'olivo (Nota descrittiva). Agr. Ital., LVIII (XIII N. S.), 1958.

РАЙОНИРОВАН

KULIKOV, A.I., POLYAKOVA, S.I., & ELIKHINA, T.F. 1967

Ob uderzhivaemosti protravitelya na semenakh. [On the persistence of chemicals on seeds.]

Kukuruza, 12 (5): 29-30. [2 tables.]

Microfilm no. 14203

ДЛЯ ПОЛУЧЕНИЯ высоких уро… кукурузы наряду с хорошей а… техникой важное значение имеет п… семенами высокопродуктивных рай… рованных гибридов и сортов, приспо… ленных к местным условиям.

Государственная комиссия с учас… областных, краевых и республикан… инспекторов рассмотрела предлож… с мест о районировании на 1967 … тивных гибридов и на основании ре… на текущий год районированы сле… для различных зон страны.

Гибрид Краснодарский 436М — д… рид Краснодарского научно-иссл… сельского хозяйства. Автор гибри… ческого Труда академик ВАСХНИЛ … получен от скрещивания простого … ная) на простой гибрид (лин. Ст—2 × лин. Гф—2).

Гибрид среднеспелый, созревает одновременно с гибридом ВИР 42. Растение сравнительно высокорослое, хорошо облиственное, устойчивое к полеганию и вполне пригодное для механизированной уборки. Гибрид отличается хорошей устойчивостью к засухе. Районируется впервые в Краснодарском крае на спелое зерно в целом по краю и на силос в I, IV, V и VI зонах.

Имея одинаковый с ВИР 42 вегетационный период, Краснодарский 436М в то же время значительно превышает его по урожаю зерна. Средний за три года урожай зерна Краснодарского 436М оказался на 4,3 центнера выше, чем ВИР 42; на Гиагинском сортоучастке — на 7,4 и на Отрадненском — на 8,9 центнера с гектара. На Усть-Лабинском сортоучастке Краснодарского края за три года испытания урожай зерна Краснодарского 436М составил в среднем 86,2, в том числе в 1964 году — 98,4 центнера с гектара. По урожаю зеленой массы Краснодарский 436М почти одинаковый с ВИР 42. Семеноводство гибрида осуществляется на стерильной основе по схеме 2 (смешения).

Гибрид перспективен для степных районов Северного Кавказа, юга Украинской ССР, Молдавии, где в настоящее время районирован ВИР 42.

Гибрид Днепровский 247МВ — сортолинейный гибрид Всесоюзного научно-исследовательского института кукурузы. Автор академик ВАСХНИЛ Б. П. Соколов. Получен от скрещивания довольно раннеспелого холодостойкого сорта Шиндельмайзер (стерильный) с простым гибридом Искра (лин. ВИР 26МВ × лин. ВИР 27МВ). Гибрид среднеранний. Имеет довольно высокорослое, хорошо облиственное растение, устойчив к полеганию. Болезнями и вредителями поражается слабо.

По урожаю зеленой массы и сухого вещества в большинстве случаев превышает районированный гибрид Буковинский 3 при одинаковой с ним скороспелости. На сортоучастках Курской области в среднем за три года испытания урожай зеленой массы гибрида составил 475—621 центнер и сухого вещества в урожае — 118,4—225,4 центнера с гектара. В Литовской ССР за четыре года испытания гибрид Днепровский 247МВ по урожаю зеленой массы превысил районированный гибрид Буковинский 3 в среднем на 57—130 центнеров (при урожае 564—978 ц) и по сухому веществу — на 3,5—41,7 центнера с гектара. Высокие урожаи его получены в 1966 году—на Шилутском сортоучастке — 978, на Пакруойском — 927, на Укмергском — 831 центнер с гектара.

Гибрид Днепровский 247МВ, часто превышая по урожайности гибрид Буковинский 3, по другим хозяйственно ценным признакам почти одинаков с ним, кроме того, имеет более удобное и дешевое семеноводство, так как в качестве отцовской формы у него не линия, а простой гибрид.

Он холодоустойчив, поэтому перспективен для новых районов возделывания кукурузы. На 1967 год он впервые районируется на силос по III зоне Курской области, в Липецкой области, в Литовской ССР, Киевской и Черкасской областях Украины.

БИОЛОГИЯ, СЕЛЕКЦИЯ И СЕМЕНОВОДСТВО

…всей Удмуртской АССР.

Гибрид Воронежский 38ТВ — сортолинейный гибрид Воронежской опытной станции Всесоюзного института кукурузы. Получен путем скрещивания сорта Воронежская 76Т (стерильная) с простым гибридом Рассвет (лин. Черновицкая 21ТВ × лин. ВИР 27ТВ). Гибрид раннеспелый, созревает одновременно с Буковинским 2, но более продуктивный. Отличается довольно высокой холодостойкостью и засухоустойчивостью. В центрально-черноземных районах вызревает и дает зерно полной спелости. На сортоучастках Воронежской области за четыре года испытания средний урожай спелого зерна его составил 37,1 центнера, а в отдельные годы повышался до 50—60 центнеров с гектара. Так, в 1964 году на Ольховатском сортоучастке собрали зерна этого гибрида 62,6 центнера, на Борисоглебском — 59, на 8,5 центнера с гектара выше, чем Буковинского 2ТВ. Гибрид впервые районируется в Воронежской и Липецкой областях.

Гибрид Сибирский 4ТВ — сортолинейный гибрид института цитологии и генетики Сибирского отделения Академии наук СССР. Получен от скрещивания простого гибрида (лин. ВИР 29Т × лин. ВИР 26зТ) на сорт Рисовая 645ТВ. Гибрид среднеранний, засуху переносит удовлетворительно. Имеет растения средней высоты, хорошо облиственные. Высокоурожайный, по урожаю зеленой массы нередко превышает районированный гибрид Буковинский 3. На сортоучастках Новосибирской области за четыре года испытания урожай зеленой массы гибрида составил в среднем 278 центнеров с гектара, на 21 центнер выше, чем Буковинского 3. На Маслянинском сортоучастке средний за четыре года урожай этого гибрида составил 410 центнеров — на 33 центнера с гектара выше Буковинского 3.

Гибрид Сибирский 4ТВ районируется в Новосибирской области для уборки на силос.

Гибрид ДВ 19/216ТВ — двойной межлинейный гибрид совместной селекции Поволжской селекционно-опытной станции и Всесоюзного научно-исследовательского института кукурузы.

Получен от скрещивания простого гибрида Ракета (лин. ВИР 106Т × лин. ВИР 103зТ) на простой гибрид Волна (лин. ВИР 40ТВ × лин. ВИР 44ТВ). Гибрид среднеранний, холодоустойчивый и довольно устойчивый к засухе.

Гибрид ДВ 19/216ТВ по продуктивности довольно близок к районированному Днепровский 98, но имеет более удобное семеноводство, что облегчает выращивание его семян в семеноводческих хозяйствах.

На богарных сортоучастках Волгоградской области в среднем за четыре года урожаи спелого зерна гибрида составили 21,6—41,9 центнера с гектара и зеленой массы — 127—291 центнер. Гибрид ДВ 19/216ТВ районируется в Волгоградской области на зерно и силос на богаре.

Кроме новых гибридов, районируются также стерильные формы уже районированных гибридов ВИР 156ТВ и Днепровский 56ТВ.

Гибрид ВИР 156ТВ. По урожайности и другим хозяйственным и биологическим признакам гибрид почти не отличается от гибрида ВИР 156Т. Двойной межлинейный гибрид ВИР 156

(ВИР 156Т), семеноводство которого до сих пор осуществлялось по схеме 2 (смешения), переведен Кубанской опытной станцией ВИР и Краснодарским научно-исследовательским институтом сельского хозяйства на схему 1 (восстановления). Выращивание семян гибрида ВИР 156ТВ будет производиться по схеме (ВИР 133Т × ВИР 157зТ × ВИР 64ТВ × × ВИР 158ТВ). Для удобства перевода гибрида на стерильную основу селекционерами допущена перестановка родительских линий ВИР157 и ВИР64. Гибрид ВИР 156ТВ районируется в Джамбулской области на зерно и силос при орошении.

Гибрид Днепровский 56 ТВ — это сортолинейный, широко районированный гибрид Днепровский 56 селекции Всесоюзного института кукурузы, переведенный этим же институтом на стерильную основу с семеноводством по схеме 1 (восстановления фертильности). Материнская форма — простой гибрид Искра Т (лин. ВИР 26 Т × лин. ВИР 27зТ), отцовская форма — сорт Северодакотская ТВ.

По хозяйственным и биологическим свойствам гибрид Днепровский 56 ТВ соответствует своей фертильной форме. Районируется впервые в Карагандинской, Павлодарской, Восточно-Казахстанской, Кустанайской, Северо-Казахстанской, Кокчетавской, Целиноградской областях и Тувинской АССР наряду с фертильной формой.

Гибрид Днепровский 921 (рисовый) селекции Всесоюзного научно-исследовательского института кукурузы, впервые районируется для нужд предприятий Министерства торговли и пищевой промышленности. Получен от скрещивания сорта Рисовая 645 с простым межлинейным гибридом (р 18 × р 40). Гибрид среднеранний, сравнительно засухоустойчивый. Районируется на зерно в Одесской, Днепропетровской, Харьковской и Ростовской областях. Зерно гибрида используют для приготовления так называемой воздушной кукурузы. Гибрид высокопродуктивный. На сортоучастках Ростовской области за три года испытания по урожаю зерна он превысил районированный сорт Рисовая 645 на 5,8—8,9 центнера с гектара при урожае 24,4—31,9 центнера с гектара. По технологическим свойствам: выходу стандартных воздушных зерен, коэффициенту увеличения объема после взрывания и весу одного литра воздушных зерен гибрид превосходит сорт Рисовая 645.

На 1967 год вновь значительно расширяется районирование таких высокопродуктивных гибридов, как ВИР 42МВ (Украина, Северный Кавказ, Молдавская ССР, Грузинская ССР); Краснодарский 309Т (южные области Украины, Северный Кавказ); Буковинский 3ТВ (Украинская ССР, Сибирь), Днепровский 56Т (РСФСР, северные области Казахской ССР); Буковинский 2ТВ (Поволжье, Сибирь); Киевский 8, Краснодарский 4ТВ; Краснодарская 1/49, сорта Одесская 10 и других.

Снимаются с районирования, как низкоурожайные, гибриды Буковинский 1 в Черниговской области и Минский 1 в Белорусской ССР, а также сорта Первомайская (Оренбургская область) и Московская 3 (Московская область).

Всего на текущий год районировано около 94 гибридов и сортов, в том числе 49 гибридов, из них почти все стерильные.

Внедрение на поля колхозов и совхозов высокопродуктивных гибридов и сортов поможет кукурузоводам добиться в юбилейном году еще больших успехов.

ОБ УДЕРЖИВАЕМОСТИ ПРОТРАВИТЕЛЯ НА СЕМЕНАХ

А. И. КУЛИКОВ,
С. И. ПОЛЯКОВА,
Т. Ф. ЕЛИХИНА
Всесоюзный научно-исследовательский институт защиты растений

531.172/173

При протравливании кукурузы очень важно, чтобы при перевозке и пересыпании протравитель прочно удерживался на семенах. Методику определения степени удерживаемости протравителя на семенах кукурузы разработали авторы данной статьи.

Удерживаемость протравителя в процентах определяют по остатку химиката (ТМТД) на семенах после встряхивания их, пересыпания и отдувки. Количество ТМТД на семенах кукурузы по нашему методу определяют с помощью фотоэлектроколориметра (см. журнал «Защита растений от вредителей и болезней» № 8 за 1962 год). Если фотоэлектроколориметра нет, то количество ТМТД (с меньшей точностью) определяют с помощью прибора ВИЗР-1 (см. журнал «Кукуруза» № 12 за 1963 год). При работе с фотоэлектроколориметром лучше брать ацетон безводный. Образец семян не менее 1,2 килограмма следует отбирать по ГОСТу № 5055-56.

Чтобы определить исходное количество ТМТД на семенах, пятидесятиграммовую навеску семян помещают в плотно закрывающуюся банку, заливают 50 миллилитрами ацетона и встряхивают. Часть раствора (5—15 мл) фильтруют и 0,5 миллилитра переносят пипеткой в пробирку. Затем туда вносят 4,5 миллилитра ацетона и 0,9 миллилитра реактива на ТМТД (растворенные в литре воды 0,3 миллилитра концентрированной серной кислоты или грамм сульфаминовой кислоты, три грамма гидрохинона и 0,6 грамма сернокислой меди). Пробирку закрывают пробкой и оставляют на 10—15 минут. Затем содержимое пробирки сливают в кюветку фотоэлектроколориметра, определяют оптическую плотность пробы, а после по калибровочной кривой находят в нем содержание ТМТД. Содержание ТМТД в пробе с помощью прибора ВИЗР-1 определяют, сравнивая окраску пробы со стандартными растворами. Анализы проводят в трех повторностях — три навески семян по 50 граммов каждая.

Расчет количества ТМТД на семенах делают по формуле $C = 2A$, где С — количество граммов протравителя на килограмм семян; А — количество миллиграммов ТМТД в пробе.

После первоначального определения количества ТМТД на семенах образец семян не менее килограмма с высоты 50 сантиметров постепенно пересыпают в картонную коробку или фанерный ящик. Сыплющееся зерно в плоскости падения с помощью вентилятора обдувают воздухом со скоростью 10 метров в секунду. Пересыпают и обдувают семена дважды.

Затем из образца семян выделяют три пятидесятиграммовые навески, определяют в каждой содержание ТМТД, как было сказано выше, и вычисляют удерживаемость протравителя по формуле $У = 100 \cdot \frac{C_1}{C}$, где У — процент удерживаемости протравителя, С — первоначальное содержание ТМТД на семенах в граммах на килограмм семян, C_1 — содержание ТМТД на семенах после механических воздействий на них.

Обдутые семена помещают в полиэтиленовый мешочек, завязывают (неплотно, чтобы семена частично пересыпались в мешочке) и ставят его в аппарат (качалку) для встряхивания. Если мешочков с семенами много, их укладывают в аппарате в один ряд, чтобы при встряхивании они не перемещались.

В аппарате-качалке семена встряхивают со скоростью сто качаний в одну сторону в минуту. При меньшем количестве качаний длительность встряхивания соответственно удлиняют. После обработки в аппарате семена дважды пересыпают и обдувают, а затем отбирают три пятидесятиграммовые навески, определяют в каждой содержание ТМТД и вычисляют процент удерживаемости протравителя.

Девятичасового встряхивания вполне достаточно для определения степени удерживаемости протравителя на семенах, но более полная картина получается, если семена встряхивать с промежутками: через три, шесть, девять, двенадцать и двадцать четыре часа. После каждого периода встряхивания семена следует дважды пересыпать и обдувать.

Вначале мы не встряхивали семена, а помещали их в банки и по нескольку часов вращали в барабане шаровой мельницы, но вскоре отказались от такого метода. Встряхивание на качалке создает более постоянные и сравнимые условия испытания. Такой метод определения степени удерживаемости

протравителя на семенах позволяет дать довольно объективную количественную оценку применяемых при протравливании прилипателей и рецептуры протравителей вообще.

В печати неоднократно сообщалось (см., например, журнал «Кукуруза» № 11 за 1963 год) о том, что колхозы и совхозы получали семена с кукурузообрабатывающих заводов, на которых оставалось протравителя в 5—10 раз меньше, чем должно было быть. Объясняли это тем, что при перевозке семян химикат якобы осыпается. Мы определяли степень удерживаемости програвителя ТМТД на семенах кукурузы, протравленных водной суспензией 50-процентного дуста ТМТД как без добавок прилипателя (табл. 1), так и с различными прилипателями (табл. 2).

Таблица 1

КОЛИЧЕСТВО ТМТД НА СЕМЕНАХ КУКУРУЗЫ, ПРОТРАВЛЕННЫХ БЕЗ ПРИЛИПАТЕЛЕЙ

Количество ТМТД на семенах кукурузы					
первоначальное (г/кг)	осыпалось после пересыпания и отдувания (г/кг)	осталось в % к первоначальному после:			
		пересыпания и отдувания	встряхивания, пересыпания и отдувания (в течение часов)		
			3	9	24
2,0	0,200	90	77	64	61
1,6	0,160	90	75	64	58
1,25	0,125	90	77	67	60
1,0	0,080	92	85	68	65
0,8	0,070	87	72	63	64
0,6	0,036	94	80	66	64
0,4	0,032	92	81	74	74

Как видно из данных таблицы 1, независимо от полноты протравливания семян после пересыпания и продувания их практически теряется около 10 процентов препарата. При увеличении периода встряхивания семян (даже после 24 часов и восьми пересыпаний с продуванием) потери протравителя не превышали 40 процентов, причем увеличение периода встряхивания с 9 до 24 часов практически не сказывается на осыпаемости протравителя. Если же учесть, что протравленные семена с калибровочных заводов перевозят в зашитых мешках, то станет очевидным, что попытки объяснить поступление с заводов в хозяйства недопротравленных семян только осыпаемостью протравителя явно несостоятельны. При перевозках какая-то часть протравителя, конечно, осыпается, но если на семена нанесли достаточное количество протравителя, то осыпание химиката не уменьшит резко полноты протравливания.

Таблица 2

УДЕРЖИВАЕМОСТЬ ТМТД НА СЕМЕНАХ КУКУРУЗЫ, ПРОТРАВЛЕННЫХ С РАЗЛИЧНЫМИ ПРИЛИПАТЕЛЯМИ

Рецептура суспензии	Осталось на семенах ТМТД (%) к первоначальному после:					
	пересыпания с отдувом	встряхивания (в течение часов) с последующим пересыпанием с отдувом				
		3	6	9	12	24
ТМТД + вода	92	83	—	68	—	65
КСБ 10%; ОП-7 2 г/л	96	94	—	85	—	81
То же. Семена хранились 18 месяцев	95	92	87	—	81	82
КСБ 10%; ЭГ 4 г/л	95	88	—	81	—	80
Силикатный клей 20 г/л	81	68	—	61	—	52

При рассмотрении данных таблицы 1 на первый взгляд может показаться странным, что при различном количестве ТМТД на семенах степень удерживаемости его почти одна и та же. По нашему мнению, это объясняется тем, что степень удерживаемости дуста в значительной степени зависит от размера его частиц: удерживаются на семенах главным образом наиболее мелкие частицы. А так как процент таких частиц в дусте ТМТД в наших опытах протравливания был один и тот же, то и степень удерживаемости протравителя (процент, а не абсолютное количество) была одинаковой независимо от полноты протравливания.

Степень удерживаемости ТМТД семенами кукурузы, протравленными суспензией (пять литров на тонну семян) с добавками прилипателей, можно видеть, рассмотрев данные таблицы 2.

Концентрат сульфитно-спиртовой барды (КСБ) как с этиленгликолем (ЭГ), так и со вспомогательным веществом ОП-7 повышает степень удерживаемости дуста ТМТД семенами кукурузы, которая не снижается при длительном (до 18 месяцев) хранении протравленных семян.

При использовании малоэффективного прилипателя (силикатный клей) степень удерживаемости протравителя на семенах не увеличивается, а даже уменьшается. Объясняется это тем, что плохой прилипатель склеивает между собой частицы протравителя. Более же крупные частицы плохо удерживаются на поверхности семян и легче ссыпаются с них, чем дуст протравителя без прилипателя.

Приведенные в таблицах данные — пример возможности применения предложенного нами метода определения степени удерживаемости протравителя на семенах кукурузы.

Полосовое внесение пестицидов

Н. С. КАРАВЯНСКИЙ,
кандидат сельскохозяйственных наук
Всесоюзный научно-исследовательский институт кормов

633.15 : 631.5

В НАСТОЯЩЕЕ время борьбу с вредителями и сорняками в посевах кукурузы проводят, опрыскивая или опыливая растения инсектицидами и гербицидами. До появления всходов участки обрабатывают гербицидами, а в фазе двух-трех листьев применяют инсектициды. Сплошная и раздельная обработки растений ядохимикатами повышают себестоимость продукции, загрязняют почву и корм остатками химических препаратов.

При пунктирном способе посева вполне достаточно обработать химикатами только рядки и защитные зоны, которых не касаются рабочие органы культиватора. Такой способ применения химических средств получил название полосового. Его эффективность и особенно экономичность возрастают при внесении пестицидов одновременно с посевом кукурузы: при ширине обрабатываемой полосы 25—30 сантиметров расход препарата по сравнению со сплошным внесением при междурядьях 70 сантиметров сокращается в три раза. Стоимость симазина, например, при сплошном внесении в посевах кукурузы (4—6 кг/га) составляет от 16 до 23 рублей, гексахлорана — три рубля, а при полосовом при междурядьях 70 сантиметров соответственно четыре, восемь рублей и 67 копеек.

Внесение пестицидов на удобрениях (фосфоритной муке, суперфосфате, извести и др.) исключает необходимость в доставке воды, приготовлении рабочей жидкости, заправке, оплате тракториста, уходе за опрыскивателем и др. Рациональность полосового внесения пестицидов подтверждают не только экономические соображения. Известно, что ГХЦГ и симазин могут накапливаться в почве и оказывать вредное влияние как на последующие за кукурузой культуры, так и на животных. Симазин, в частности, сохраняет свою токсичность и на следующий год после внесения, что не позволяет высевать на обработанных этим гербицидом участках многие культуры. При полосовом же внесении пестицидов этот недостаток почти исключается, так как после перепашки поля общее количество симазина и гексахлорана на каждом гектаре значительно снижается. Полосовое внесение пестицидов широко применяют и за рубежом. В отечественной литературе на экономическое значение полосового

внесения пестицидов указывают М. Я. Березовский (1964 год), Н. Т. Бобылев (1963 год), Ю. В. Будьонин, А. В. Тарасов (1964 год), С. А. Персин (1964 год), И. А. Макодзеба, А. В. Фисюнов (1965 год), И. Велицкий (1965 год) и др.

Полосовое внесение пестицидов (инсекцитидов и гербицидов) одновременно с посевом кукурузы и их влияние на вредителей и сорные растения мы изучали в течение 1964—1965 годов в опытном хозяйстве Всесоюзного научно-исследовательского института кормов. Почвы — сильно оподзоленные, тяжелосуглинистые с небольшим (2—2,6%) содержанием гумуса, сильно заплывающие.

Из инсектицидов изучали 12-процентный дуст ГХЦГ, из гербицидов — симазин (в виде 50% дуста). ГХЦГ вносили из расчета 10 килограммов на гектар, а симазин и атразин — 0,5; 1,0 и 1,5 килограмма действующего вещества на гектар. Контроль — делянки со сплошным довсходовым опрыскиванием посевов симазином (два килограмма действующего вещества на гектар) и опыливанием всходов ГХЦГ (20 килограммов на гектар). В качестве наполнителей для указанных препаратов изучали фосфоритную муку, известь и суперфосфат. Фосфоритную муку брали из расчета 30—50 килограммов на гектар, а суперфосфат и известь — по 50. Наполнители и ядохимикаты тщательно перемешивали и вносили на рядки кукурузы специальным приспособлением к пунктирной кукурузной сеялке. Ширина обрабатываемой полосы 20—25 сантиметров.

Опытные и контрольные делянки выравняли по фосфору, калию и извести. Размер делянок в 1964 году — 50 квадратных метров, в 1965 — 620, в 1966— 420 квадратных метров. Повторность опыта — трехкратная. Предшественники кукурузы: в 1964 году — сахарная свекла, в 1965 и 1966 годах — кукуруза.

Во всех вариантах опыта высевали пунктирным способом гибрид Буковинский 3 с шириной междурядий 60 сантиметров. Семена перед посевом обработали 60-процентным ТМТД и 12-процентным дустом гексахлорана с бардяным концентратом (прилипателем). Определяли эффективность пестицидов на повреждаемость растений шведскими мухами и проволочниками, засоренность посевов и на урожай зеленой массы. Повреждаемость кукурузы шведскими мухами учитывали в фазе четырех-

Таблица 1

ПОВРЕЖДАЕМОСТЬ КУКУРУЗЫ ШВЕДСКИМИ МУХАМИ В ЗАВИСИМОСТИ ОТ СПОСОБА ПРИМЕНЕНИЯ ПЕСТИЦИДОВ (%)

Вариант опыта	1964 г.	1965 г.	1966 г.
Сплошная довсходовая обработка симазином и ГХЦГ в фазе 1—2 листьев	4	16	43
ГХЦГ + симазин на фосфоритной муке	1	11	14
ГХЦГ + симазин на извести	—	13	17
ГХЦГ + симазин на суперфосфате	—	11	19

шести листьев. Засоренность посевов за вегетационный период учитывали три раза.

Помимо учета зеленой массы на учетных площадках, кукурузу убирали силосоуборочным комбайном и отвозили на весы.

Из таблицы 1 видно, что внесение гексахлорана одновременно с посевом кукурузы надежно защищает молодые растения от шведских мух. Степень повреждения растений вредителями при полосовом внесении гексахлорана, как правило, была ниже, чем на делянках, где этим химикатом опыливали растения сплошь. Эффективность полосового внесения гексахлорана одновременно с посевом кукурузы особенно заметно проявилась в 1966 году: количество поврежденных растений шведскими мухами по сравнению со сплошной обработкой кукурузы гексахлораном было в два-три раза меньше.

Преимущество полосового внесения гексахлорана в том, что он защищает кукурузу от вредителей в течение прорастания семян и появления всходов, то есть в самый ранний период лёта шведских мух. Опыливать же растения в фазе трех-четырех листьев нецелесообразно, так как кукуруза к этому времени бывает уже заражена яйцами шведских мух.

Полосовое внесение гексахлорана эффективно и против проволочников. Гибель последних от гексахлорана, внесенного полосой, достигала 54 процентов, а на контроле — только 24. Повреждаемость кукурузы в опытах с внесением гексахлорана на фосфоритной муке была в шесть раз меньше, чем при одной только обработке семян ядохимикатами. Применение гексахлорана на суперфосфате снизило повреждаемость растений проволочниками незначительно (на девять процентов). Эффективность пестицидов на снижение численности сорняков в посевах кукурузы приведена в таблице 2.

Внесенный в почву одновременно с посевом кукурузы симазин попадает в благоприятные условия увлажнения почвы, где хорошо растворяется и губительно действует на сорняки. В условиях нечерноземной зоны вслед за посевом кукурузы, как правило, проходят дожди, значительно усиливая токсическое действие симазина на сорные растения.

Таблица 2

ВЛИЯНИЕ ПОЛОСОВОГО ВНЕСЕНИЯ СИМАЗИНА НА КОЛИЧЕСТВО СОРНЯКОВ
(штук на кв. м в защитной зоне)

Вариант опыта	1964 г.	1965 г.	1966 г.
Контроль (хоз.)	57	20	14
ГХЦГ + симазин на фосфоритной муке	11	17	2
ГХЦГ + симазин на суперфосфате	22	15	2
ГХЦГ + симазин на извести	—	12	1

Урожай зеленой массы кукурузы на делянках с полосовым применением ядохимикатов в 1964 году был выше урожая на контроле на 57 центнеров, а в 1966 году — на 27—88. Отрицательного влияния на качество корма полосовое внесение пестицидов не оказало. Экономическую характеристику изучаемых вариантов опыта мы обобщили в таблице 3.

Таблица 3

ЭКОНОМИЧЕСКАЯ ЭФФЕКТИВНОСТЬ ВНЕСЕНИЯ ПЕСТИЦИДОВ ОДНОВРЕМЕННО С ПОСЕВОМ КУКУРУЗЫ

Показатель	1965 г.			1966 г.		
	контроль (хоз.)	симазин 0,5 кг д. в. + 10 кг ГХЦГ на гектар		контроль (хоз.)	симазин 0,5 кг д. в. + 10 кг ГХЦГ на гектар	
		на фосфоритной муке	на извести		на фосфоритной муке	на извести
Урожай зеленой массы (ц/га)	469	463	440	472	560	540
Общий сбор продукции (ц норм. ед.)	75	74	71	75.4	89.6	84.4
Прибавка урожая (ц норм. ед.)	1	—	—	—	14.2	11.0
Стоимость полученной продукции (руб.)	3.45	—	—	—	106.5	82.5
Всего затрат, связанных с защитными мероприятиями (руб/га)	21.23	4.88	4.88	21.23	4.88	4.88
Затраты, связанные с производством центнера кормовой единицы (руб.)	0.37	0.06	0.06	0.37	0.05	0.05

Затраты на внесение пестицидов полосовым способом одновременно с посевом оказались в 4—4,5 раза меньше, чем на контроле. Удорожание корма на контроле произошло в основном за счет симазина, ГХЦГ, оплаты трактористу, опрыскивания и ухода за опрыскивателем и трактором.

На основании исследований можно сделать следующие выводы. Полосовой способ применения пестицидов одновременно с посевом кукурузы, по сравнению со сплошным внесением, снижает расход ядохимикатов в четыре-пять раз и почти полностью защищает растения от вредителей и сорняков. Полосовое внесение пестицидов не оказывает отрицательного влияния на рост и развитие кукурузы и не снижает питательных достоинств корма.